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China Report

ECONOMIC AFFAIRS

No. 323

ENERGY: STATUS AND DEVELOPMENT --XV

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Hong Kong WEN WEI PO in Chinese 6, 7 Jan 83

[Article by Hao Bin [3493 1755]: "The Present Status of and Future Outlook for China's Energy Structure"]

[6 Jan 83 p 14]

[Text] (I) Coal

Coal is China's primary source of energy. In 1978, the actually measured reserve was 600 billion tons. Over 60 percent of the counties throughout the nation have coal resources. The precise reserves where coal mines can be built amounted to 30 billion tons. From 1949 to 1979, the whole nation's output of coal increased from 32 million tons to 635 million tons, an increase of 18 times and registering an annual growth rate of 10.4 percent. The distribution of coal has also improved greatly. The coal industry has developed by varying degrees whether in the southwest, the northwest or in the nine provinces south of the Chang Jiang where there is a lack of coal. The resources of China's coal industry are reliable and the basis is sizable. As long as transportation and the use and treatment of the three wastes can keep pace, China has the conditions to produce and to use more coal.

The construction period required to develop coal is long and rather difficult. To build a coal mine producing over 1 million tons generally requires about 10 years from the time of constructing the mine to the time it reaches the designed capacity. Therefore, while the depth of the mines and the amount of construction continue to increase year after year, the coal investment ratio must gradually increase in order to guarantee sustained, stable growth in the output of coal. But actually, China has been unable to do this. During the "First Five-year Plan," investment in coal development constituted 12.3 percent of total industrial investment. During the "Second Five-year Plan," it constituted 13 percent. The ratio of investment in coal during these 10 years basically remained stable. A total of 213 million tons of coal production capacity was added, constituting an average annual increase of 21 million tons. During the "Third Five-year Plan," the investment ratio dropped to 9.2 percent. During the "Fourth Five-year Plan," it was 9.6 percent.

The ratio during the past 10 years dropped by 3 percent from the previous 10 years. Coal production capability increased by 149 million tons, constituting an annual average increase of 14 million tons. Although the investment ratio between 1976 and 1978 rose again, reaching 10.4 percent, because there were too many deficiencies, and with the loss in capacity of old mines abandoned each year, the newly added capability did not visibly increase. The annual average growth was 14 million tons. Because of the drop in the investment ratio, the scale of mines under construction was small. In 1970, the scale of construction of mines was 158 million tons. In 1978, this dropped to 130 million tons. In 1980, this dropped again to 100 million tons. Such a scale of construction can only provide over 10 million tons of new capacity a year. Deducting the several million tons not being produced anymore by abandoned mines, the increased output is even less. Therefore, it is very difficult to satisfy the needs of the current year. To ease this conflict and adapt to consumption needs, a campaign to develop the potential of coal mines throughout the nation was launched. After 1965, the output of coal remained at an annual growth rate of 30 million tons, more than one-fold over the newly added capability. Because of unilateral pursuit of output, an irrational ratio between the newly added capability each year and the growth of coal output was necessarily created, and China lived off its past gains. During the "First Five-year Plan," the ratio between the capability of new mines that began production and the growth in output was 1 to 1. During the "Second Five-year Plan," it was 1 to 0.6, during the "Third Five-year Plan" it was 1 to 1.8, during the Fourth Five-year Plan" it was 1 to 1.58, between 1976 and 1978, it reached to 1 to 3.18. The output of some relatively large coal mines throughout the nation has already reached one-fold or nearly one-fold over the originally designed capability. It would not be too easy to further increase the output by a large scale.

According to the present scale of construction of coal mines and progress in the reorganization of production mines, it is estimated that before 1985, the growth rate of coal will be 2.5 percent, an average annual increase of 17 million tons in output. By that time, the output of coal will be 720 million tons. From 1980 to 1990, the growth rate of coal will be about 4.6 percent, an average annual increase of 36 million tons. In 1990, coal production will reach 900 million tons. It is expected that by the end of this century, coal output will reach 1.4 billion tons, an average annual increase of 4.5 percent.

(II) Petroleum

China's petroleum resources are far less abundant than coal. Proved reserves are mainly concentrated in in the northeast, north China, along the coast and in the Xinjiang area. The reserves in the south-central and southwest areas are very scarce, and distribution is very uneven. Since the founding of the nation, the development of China's petroleum industry has been very rapid. At the time of liberation, the whole nation only

had two small oil fields at Yumen in Gansu and Yanchang in Shaanxi and some dry distillation furnaces for shale at Fushun. Crude oil production was 120,000 tons. After 30 years of buildup, the petroleum industry had undergone a great change. Now, 19 provinces and autonomous regions produce petroleum and natural gas. In 1979, the production of crude oil reached 106,130,000 tons, ranking ninth in the world. But, because the growth in the output of crude oil in recent years has far surpassed the increase in reserve, a problem of a serious deficiency in reserve resources has emerged. In 1979, the ratio between reserve and extraction of petroleum throughout the nation dropped four-fold from that in 1965.

A review of the history of development of the petroleum industry in China and in other nations of the world shows that the key to guaranteeing a sustained, stable growth in the output of petroleum is to insist on conducting geological prospecting first in order to have reserve resources that can produce increased output. But for a long time, China did not have a sufficient understanding of this problem. In particular, after a definite reserve was found, China became blindly optimistic. The tendency to emphasize exploitation and neglect prospecting was very serious.

Practical experience over the past 30 years and more proves that as prospecting work continues to deepen without major breakthroughs, the general pattern is that the geological structures progress from simple to complex, and the natural conditions change from good to bad. The major locations for exploration move from land to the ocean, the prospecting wells become deeper. In this way, the difficulty in prospecting becomes greater, and the results of prospecting also lessen.

During the 8 years from 1949 to 1957, a total of 823,000 meters of wells was prospected. During the "Second Five-year Plan," geological prospecting for oil strengthened. Investment in prospecting constituted 46.2 percent of total investment in petroleum. During this period, such large oil fields as Daqing and Shengli were discovered. A total of 2,727,000 meters of exploratory wells was sunk. The results of known petroleum reserves found per meter of well prospecting was 3 times the national average. During the 3 years of readjustment, the ratio of investment in prospecting dropped to 28.8 percent. A total of 749,000 meters of wells was prospected, and the results from oil well prospecting dropped. During the "Third Five-year Plan," the ratio of investment in prospecting rose to 57.9 percent, and progress in well sinking for prospecting was 3,599,000 meters. But the results of well prospecting continued to drop. Comparison between the "Third Five-year Plan" and the "Second Five-year Plan" periods shows that although the ratio of investment in prospecting increased 11.7 percent and progress in well sinking for prospecting increased 32 percent, but because more large oil fields were not found, the known reserves were less than half that during the "Second Five-year Plan" period. After the 1970s, in order to hasten the development of petroleum, investment in capital construction in the petroleum industry grew rapidly and the output of crude oil also grew rapidly.

But because emphasis was only on building up production, petroleum prospecting work was neglected. The ratio of investment in prospecting dropped from the 57.9 percent during the "Third Five-year Plan" period to 38.1 percent, and without continuing to discover high reserve oil fields like

Daqing, the results of prospecting were very poor. The known reserve is about the same as that during the "Second Five-year Plan" period. This has caused petroleum prospecting to lag seriously behind development and caused an imbalance in the ratio between reserves and extraction.

[7 Jan 83 p 13]

[Text] After the 1970's, the great development in China's petroleum industry stimulated the growth of the national economy, and at the same time, some problems emerged. At that time, because the estimates of petroleum resources were too optimistic, there was considerable blindness in the development and use of oil and gas. In 1970, the output of raw coal throughout the nation was 350 million tons, the output of steel was 18 million tons, the output of motor vehicles was only 87,000 units. The petrochemical industry had just begun. The industrial foundation was still weak. Under this situation, hastening the development of petroleum of course could not sustain prolonged growth in petroleum because of insufficient capital for prospecting reserves, and also because the transportation and petrochemical industries were backward, and the precious petroleum could not be fully and rationally utilized. From 1965 to 1978, the output of crude oil throughout the nation increased 8 times. The amount of oil consumed increased 9 times while the exploitable reserves increased only one-fold. Now, the cumulative amount of crude oil extracted is constituting a larger and larger proportion of the known exploitable reserve. To sustain the current intensity of extraction, a lot of work has been done to inject water into oil fields and a lot of capital has been spent. Even though results have been realized, the drop in output of the oil fields cannot be stopped. According to estimates, to sustain the present output of crude oil, 300 to 400 million tons of geological reserves of petroleum must be added each year, and a crude oil production capability of about 10 million tons must be built, otherwise the output of crude oil will drop.

Because it is difficult to estimate the time for finding reserves in the future and to estimate the scale of growth, the output of petroleum can only be estimated on the basis of known reserves. Preliminary estimates show that in 1985, the output of petroleum would be 110 million tons, basically maintaining the output level of 1980. After 1985, oil wells in the ocean will continue to play a greater role. By 1990, output is expected to reach 150 million tons, and by the year 2000, efforts will be made to produce 230 million tons, an average annual increase of 8 million tons. The average growth rate over the 15 years will be 5.1 percent.

(III) Natural Gas

Natural gas resources are mainly concentrated in the Sichuan and Guizhou areas. Each large oil field also has some associated gas. At present, the cumulative exploitable natural gas reserve is not large and the remaining exploitable reserve is also limited. In 1979, the output of

natural gas was 14 billion cubic meters. The gas fields in Sichuan produced 6.52 billion cubic meters, and 7.48 billion cubic meters of associated gas were produced in the oil fields. Because the growth of crude oil in the future is not good, it is more difficult to estimate the expected growth in the output of gas from the oil fields. And with the rate of drop in the output of gas from gas fields in Sichuan teaching 15 percent last year, the growth in the output of natural gas will not be large. Preliminary estimates show that in 1985, 15.5 billion cubic meters of natural gas will be produced, and the annual average growth over 5 years will be 300 million cubic meters. In 1990, 20.5 billion cubic meters would be produced, and the average annual increase over those 5 years would be 1 billion cubic meters. In the year 2000, 34.5 billion cubic meters would be produced, and the annual average over those 10 years would be 1.4 billion cubic meters.

IV) Hydroelectric Power

China is a nation with the most abundant hydraulic resources in the world. The theoretical reserve is 600 million kilowatts. The capacities of resources that have already been utilized at present and the capacities of the hydroelectric power stations now being built total 27 million kilowatts, constituting 4.7 percent of the theoretical resources. The potential for developing hydroelectric power is very great. But because most of the major rivers in China flow from west to east and originate in the west and flow into the East China Sea, therefore over 80 percent of the hydraulic resources are concentrated in the remote regions of the southwest and the northwest.

At the end of 1978, the nation's total installed capacity for power generation was 52,770,000 kilowatts. In 1979, the actual amount of output of electricity was 278.9 billion kilowatt-hours. The average installed capacity per 100 million kilowatt-hours of electricity was 19,000 kilowatts. The installed capacity of hydroelectric power was 15 million kilowatts, constituting 28.3 percent of the total installed capacity. Hydroelectricity constitutes about 17 percent of the total. France and Italy are nations with a relatively high percentage of hydroelectricity. The installed capacity of hydroelectricity in these two nations constitutes between 40 and 45 percent. To prevent the shortage of electricity during dry periods, some thermal power capacity is used during the dry seasons to supplement insufficient capacity. Therefore, the average installed capacity to generate 100 million kilowatt-hours of electricity is 28,000 to 29,000 kilowatts. The unit installed capacity of generation is 1.5 times that of China. If we calculate on the basis of the situation in France and Italy, for each added percentage point in installed capacity of hydroelectricity in China, the average installed capacity to generate 100 million kilowatt-hours of electricity would have to increase by 590 to 750 kilowatts.

Hydraulic power is a regenerative energy source. Developing hydroelectricity more can conserve mineral energy sources and can also prevent environmental pollution. In long-range considerations, we should develop hydroelectricity more. But hydroelectricity is strongly seasonal.

To prevent the shortage of electricity during the dry season, we must also supplement it with thermal electricity, and this increases the investment in electric power. Also, because the percentage of coverage of forests in China is low, silting in reservoirs is very serious. According to a 1978 survey of 33 large and medium sized reservoirs throughout the nation, 16 of them have been heavily silted. Average silting has reached over 50 percent of reservoir capacity. The useful life of these reservoirs is only 13 years. And with the remoteness of the southwest and northwest regions, the transmission of electricity from these regions still relies on the development of power transmission and transformation technology in China. Therefore, development of hydroelectricity in the future must be combined closely with planting trees and forestation. China must insist on the principle of suiting measures to local circumstances and economic rationality. Hydroelectricity should be developed in key regions rich in hydraulic resources. China must develop however much hydroelectric power the localities can utilize, build as much as can be transmitted. As China's economy and technical level improve, the percentage of hydroelectricity can be gradually increased.

Forecast of China's Energy Structure

	Total	Coal	Petroleum	Natural Gas	Hydroelectric Power
1979 (year)					
Real (10,000 tons)		635,000	10,615	14 billion cubic meters	50.1 billion kilowatt-hours
Converted to standard coal (10,000 tons)	64,411	45,357	15,143	1,862	2,049
Percentage (%)	100	70.42	23.51	2.98	3.18
1985 (year)					
Real (10,000 tons)		72,000	11,000	15.5 billion cubic meters	70 billion kilowatt-hours
Converted to standard coal (10,000 tons)	72,005	51,429	15,714	2,062	2,800
Percentage (%)	100	71.40	21.82	2.86	3.89
1990 (year)					
Real (10,000 tons)		90,000	15,000	20.5 billion cubic meters	90.0 billion kilowatt-hours
Converted to standard coal (10,000 tons)	91,952	64,286	21,429	2,727	3,510
Percentage (%)	100	69.91	23.30	2.97	3.82
2000 (year)					
Real (10,000 tons)		140,000	23,000	34.5 billion cubic meters	150 billion kilowatt-hours
Converted to standard coal (10,000 tons)	142,846	100,000	32,857	4,589	5,400
Percentage (%)	100	70.01	23.00	3.21	3.78

*Taken from "Study of the Problem of China's Economic Structure," December 1981, published by the People's Press, 808 pages, 610,000 characters. Chief editor: Ma Hong [7456 3163]. Price: HK$18.

*Ma Hong [7456 3163]: First Deputy Secretary of the State Council, Director of the China Social Sciences Institute, head of the Technology and Economics Research Center of the State Council and Deputy Editor of the Chinese Economic Yearbook.

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CSO: 4013/98

SHELL COAL INTERNATIONAL TO DO FEASIBILITY STUDY IN SHANDONG

HK030116 Hong Kong SOUTH CHINA MORNING POST in English 3 Feb 83
p 1

[Article by John Bussey]

[Excerpts] Shell Coal International has signed an agreement with the China National Coal Development Corporation to do a feasibility study of a proposed coal mine in Shandong Province.

The agreement, reached last Friday, calls for a general study of the Jining No 2 mine. The mine has a potential annual production of 3 million tons, an industry source said.

The regional manager for Shell Coal International, Mr J. M. Howard, said yesterday that the study would take about 6 months. It will deal with broad issues such as the quality of the coal at the site and transportation and construction problems which might be encountered.

Mr Howard called the project a joint-venture with the Chinese, though he declined to reveal further details of the relationship.

If the mine is developed, the coal would be shipped by rail to a port at Shijiusuo, about 300 kilometers east of the mine. The port and rail lines between the mine and the sea are already under construction and are being financed with the help of Japanese loans. Shell would not play a role in construction of the rail lines or the port.

As proposed, Jining No 2 would be an underground, rather than surface, mine. Both metallurgical and steam coal are located in Shandong Province and it is possible that the mine would produce both types, Mr Howard said.

It has not been decided whether the coal from Jining No 2 would be exported or used to satisfy China's growing domestic energy needs. "We would obviously want to export," Mr Howard said.

CSO: 4010/42

NATIONAL POLICY

ENERGY, TRANSPORTATION TO BE KEY NATIONAL INVESTMENT AREAS

Taiyuan SHANXI RIBAO in Chinese 1 Dec 82 p 1

[Article: "Energy and Transportation Are the Focus of Investment"]

[Text] Premier Zhao Ziyang said today at the Fifth Session of the Fifth National People's Congress that the investment focus of the 890 large and medium-sized construction projects for the Sixth 5-year Plan will be energy and transportation. Of the total of 230 billion yuan in investments, 38.5 percent will be for energy and transportation. Details are given below.

Coal Industry Construction. The investment over the 5-year period will be 17.9 billion yuan, focusing primarily on developing coalfields in Shanxi, the northeast, eastern Nei Monggol, western Henan, Shandong, Anhui, Jiangsu and Guizhou. During the 5-year period, 28 large coal mines with capacities of a million tons a year or more will be built; this, coupled with the construction of medium and small-sized coal mines, will bring total nationwide coal mine construction to the equivalent of 220 million tons.

Petroleum Industry Construction. The investment for the 5-year plan period will be 15.4 billion yuan, focused on exploration of the Sung-Liao Basin in the northeast, the Bohai, the Puyang area of Henan, and the Erlian Basin in Nei Monggol, together with suitable intensification of surveying and exploration in the Junggar Basin in Xinjiang and the Qaidam Basin in Qinghai, continued strengthening of geological surveying and exploration in older gas fields in East China and an effort to find new oilfields, there, and active offshore exploration and development. During the 5-year period, new oil reserves of 35 million tons and gas potential of 2.5 billion cubic meters will be added.

Electric Power Industry Construction. The investment for the 5-year period will be 20.7 billion yuan, focusing on continued development of the hydroelectric resources of the upper Huang He, the middle and upper Chang Jiang and the Hongshui Basin, construction of several large-scale hydroelectric power stations, and construction of pit-mouth power stations and other fossil-fired power stations in such rich coal areas as Shanxi, eastern Nei Monggol, the Huaibei-Huainan area, west Henan, Weibei and Guizhou and high electric power consumption areas such as Liaoning, Shanghai, Jiangsu,

Zhejiang, Guangdong and Sichuan. During the 5-year period, 15 hydroelectric stations with capacities of 400,000 kW or more will be built or will continue under construction, along tih 45 fossil-fired stations with capacities of 200,000 kW or more, and one nuclear power station with a capacity of 300,000 kW; this work, together with the construction of small-scale power stations, will amount to a total power station construction effort equivalent to 36.6 million kW.

Transportation and Posts and Telecommunications Construction. Investment for the 5-year period will be 29.8 billion yuan, used primarily for railroad and harbor construction. A total of 2,000 kilometers of track will be laid, 1,700 km of double-track lines will be completed, and 2,500 km of electrified lines will be finished. In Dalian and 14 other harbors, a total of 132 deep-water berths will be built, and by 1985 total national harbor turnover capacity will increase from the 1980 figure of 217 million tons to 317 million tons.

In his report, Zhao Ziyang also gave a summary of agricultural construction planned for the Sixth 5-Year Plan period. The focus there will be on: intensifying flood protection capacities in the Huang He, Chang Jiang, Huai He and Hai He areas; construction of the Panjiakou and Daheiting reservoirs in Hebei and the Luan River diversion project in Tianjin, which will ease the shortage of industrial and agricultural water in the Beijing-Tianjin area; continued construction of commercial grain bases in the three-river plain in Heilongjiang, the Poyang Hu area in Jiangxi, the Dongting Hu area in Hunan, and the Bishi Canal area in Anhui; gradual construction and effective development of the superior varieties propagation and dissemination system; continued development of the forest protection system in the northwest North China and the northeast in order to control soil erosion in the middle Huang He region and the deposition of wind-borne sand in the northwest; continued development of the popular tree-planting movement and afforestation activities; expansion of the area of manmade grasslands, which is expected to increase from 32 million mu in 1980 to 100 million in 1985; and expansion of freshwater fish-raising area by 16 million mu and salt-water fish raising area by 800,000 mu during the 5-year period.

8480
CSO: 4013/93

STRATEGY OF EXPORTING COAL, OIL DURING DOMESTIC ENERGY SHORTAGE EXPLAINED

Shanghai SHIJIE JINGJI DAOBAO in Chinese 10 Jan 83 p 6

[Article by Liu Yuejing [0491 1878 7231]: "Why Export Coal When There's Still an Energy Shortage?"]

[Text] In recent years, along with the domestic energy shortage, many people have become increasingly concerned over the issue of China's export of petroleum and coal, and some have even associated the domestic shortages of energy with exports. It is necessary to clarify this issue.

First of all, it should be pointed out that China's export of a certain volume of petroleum and coal is necessary. The whole world is facing an energy shortage now. Since 1975 the price of petroleum has skyrocketed and though it has dropped recently, the absolute increase in price is still high. As the price of petroleum has increased, so has the price of coal. China is a nation which has a shortage of foreign exchange and to import in large amounts the technology, equipment, and other materials necessary for economic construction it is necessary to raise China's ability to pay in foreign exchange. Exporting petroleum and coal creates a high rate of foreign exchange and can be exchanged for more hard currency. For example, a ton of petroleum now sells for US$200 on the international market, and a ton of coal for about US$60. This is much more worthwhile than exporting other goods, such as agricultural sideline specialities. Take 1981 as an example. Although the volume of coal and petroleum China exported was not great, it accounted for over 22 percent of the total amount of foreign exchange earned. Secondly, petroleum and coal exports have already become a "political commodity" internationally, and from the "oil poor country" which "would be dark if separated from Western petroleum," as the imperialists referred to China, to a China exporting thousands of tons of petroleum symbolizes China's strength both economically and politically and symbolizes the basic superiority of the socialist system. As concerns this dual relationship, the export of petroleum and coal has many advantages for strengthening bilateral cooperation and alliances against hegemonism between us and Third World countries and some Second World countries.

There is a real shortage in the supply and demand relationship of energy in China now, but this was not created by exports of petroleum and coal. China's petroleum and coal exports are handled in a planned way and only with the

precondition that domestic needs are basically satisfied. Furthermore, exports make up a very small part of domestic production. For example, in 1981, China produced 620 million tons of coal and exports that year were only 1 percent of that amount; petroleum production was over 101 million tons and exports were only 12 percent of the annual production. The reason for China's energy shortage, aside from the fact that due to China's present limited capital, the limited scale of energy industry construction and the shortage of communications and shipping in some areas which has kept some energy productive capacity from being fully developed, is basically because China's energy use is now high, waste is considerable, and energy use efficiency is very low. Using 1980 as an example, China was fourth in the world in one-time energy output, but eighth in gross national product; the gross national product per ton of standard fuel was only US$470, which is only one-half, or even one-quarter, that of some industrially developed countries. It is very clear that China's per unit energy consumption index is much higher than that of other countries. Compared to ourselves we are still far from achieving the highest levels in history which we created during the First Five-Year Plan. If we calculate using the national annual coal consumption of 600 million tons, then the effectively used part is only 180 million tons, and energy loss and waste is as high as two-thirds, or about 400 million tons of standard coal. This is an alarmingly high figure! If we raised our current energy use efficiency of 28 percent to the current level of Japan (over 50 percent), in 1 year we could save about 200 million tons; if we used the coal we saved partly to replace the current high volume of petroleum burned and partly for export, then how much foreign exchange we could earn for it!

In summary, if we adopt the "squeeze" principle and every year continue to export a certain amount of petroleum and coal in exchange for hard currency, and increase our international ability to pay, and thus accelerate our use of foreign capital, to attract technology and import equipment this also can expand investment in domestic energy production and increase output. At the same time, transforming existing enterprises, and reducing energy consumption is a possible avenue to resolving the current energy shortage.

8226
CSO: 4013/116

GUANGDONG ENERGY PLANS TO DEPEND HEAVILY ON NEIGHBORING PROVINCES

Guangzhou NANFANG RIBAO in Chinese 11 Jan 83 p 2

[Interview with Deputy Governor Li Jianan [2621 1696 1344]: "What Is the Energy Situation in Guangdong and What Is the Future Prospect?"]

[Text] The energy problem is the key problem in the economic development of our province and in the realization of the four modernizations. What is the energy situation in our province and what are the future prospects? These are questions of concern of everyone. Recently, Deputy Governor Li Jianan [2621 1696 13442 answered thia reporter's questions on these topics.

[Question] What is the supply and demand situation in energy in our province?

[Answer] At present, the shortage of energy in our province is still more outstanding. Since thefounding of the nation, although our province's energy industry has developed considerably, but, by population, the per capita amount of energy per year converted to standard coal is only some 300 kilograms. The per capita amount of electricity is also only 220 kilowatt-hours, still 40 to 30 percent less than the national per capita average. In view of the present industrial and agricultural production and people's lives, the shortage of fuel and electricity throughout the province is still nearly 30 percent. Especially in recent years, because of the improvement in the standard of living, household electrical appliances have dramatically increased, and the conflict between supply and demand for electric power is more pronounced.

[Question] Since our province has a shortage of energy, then, by the year 2000, can the amount of energy adapt to the need to quadruple the total annual production value in our province's industry and agriculture?

[Answer] According to preliminary estimates, the amount of one-time energy needed in our province must correspondingly increase by over onefold to meet the requirements of quadrupling the total annual industrial production value throughout the province by the year 2000. Therefore, the task of solving the energy problem is difficult, but it is also possible because our province has many favorable conditions: One is that our province has abundant petroleum, oil shale and hydroelectric resources which can be developed and utilized. In the South China Sea oil fields, three basins at Zhujiangkou, Yinggehai, and Beibu Wan, with abundant oil and gas and with oil of better quality have been discovered.

Bids are now being accepted and reviewed. It is expected that the future will be good. The known reserve of oil-bearing shale in our province's Maoming and Hainan Island amounts to several billion tons. At present, only a very small amount is being extracted for refining. Most of its has not been developed and utilized. We are prepared to import electricity generating equipment and to build a oil shale power station to generate electricity. Our province's hydroelectric resources still have more than 5 million kilowatts awaiting future development and utilization. Each locality can build medium and small hydroelectric power stations on a large scale. The second is that our province's energy buildup already has a fair foundation. The annual output of coal has already reached more than 7 million tons. Installed generator capacity has reached more than 3 million kilowatts (including over 1.8 million kilowatts of hydroelectricity). The annual output of electricity amounts to 100,000 tons. The ability to refine crude oil by the refineries has reached more than 7.5 million tons. Each year, more than 70,000 tons of petroleum products are produced and more than 6 million tons of crude oil are processed. Third, the Central Committee has given the green light to our province to implement special policies and flexible measures. We may actively utilize foreign capital, import advanced technology, better develop and utilize our province's energy resources, and build nuclear power stations. Fourth, we have the support of sister provinces and cities throughout the nation. Some of the shortage in coal is made up for by sister provinces of Shanxi, Henan, Guizhou, and Hunan and by the state. In electric power, we must coordinate with Guangxi and Guizhou provinces to accelerate the development of the Hongshui He, and link up with the power grid of Guangdong and Guangxi. Fifth, the Central Committee has approved our province to build the southern leg of the parallel Beijing-Guangzhou Railroad and the San-Mao Railroad, and enlarge the harbors at Huangpu and Zhanjiang.

In this way, the amount of coal shipped to Guangdong from other places will be greatly reduced and the conflict in the transfer and shipment of fuel within the province can be solved.

[Question] How can we solve the problem of energy shortage in the near term?

[Answer] We must insist on implementing the principle of "placing equal emphasis on development and conservation" of energy. While grasping energy buildup, we must grasp energy conservation in a major way. At present, the effective rate of utilization of energy in our province is only 28 percent, while the national average has reached 30 percent. In industrially developed nations, this has already reached 50 to 60 percent. If the rate of effective utilization of energy in our province is raised by 1 percent, in 1 year, we can conserve more than 700,000 tons of raw coal. Therefore, each department at each level must strengthen energy management and actively study the use of highly efficient and energy conserving facilities, popularize new techniques and new technology in energy conservation, and carry out technical improvements centered around energy conservation well.

9296
CSO: 4013/115

PLANS TO AUTOMATE POWER INDUSTRY PLACE HEAVY STRESS ON COMPUTER TECHNOLOGY

Beijing DIANLI JISHU [ELECTRIC POWER] in Chinese No 11, 5 Nov 82 pp 69-75

[Article by Wang Pingyang [3769 1627 3152]: "Automation Technology in the Electric Power Industry"]

[Text] Automation is a symbol of modern technology. It has an important meaning in the safety and economy of electric power production, in the improvement of the efficacy of scientific research, and in the strengthening of information management. In recent years, this technology has developed rapidly internationally. We must catch up and develop automation technology which is suitable to our nation's situation.

This article will first describe several common problems and then discuss automation of hydroelectric power plants, thermal power plants, electric power systems, and information management.

I. Some Common Problems in the Automation of the Electric Power Industry

1. There Should Be a Concept of a Whole Network in the Automation of the Electric Power System

Hydroelectric power plants, thermal power plants and substations are all components of the electric power network. These components have different relationships with the local dispatching station, the regional dispatching station and the central dispatching station, and the relationships continue to develop and change. At present, the electric power networks are developing rapidly. Already throughout the nation, there are 13 power grids with over 1 million kilowatts, and efforts to join these networks are also developing rapidly. The relationship between the power plants and stations and the dispatching stations is changing rapidly. Therefore, automation of the power plants and power stations must be considered as a whole with the automation of the electric power networks, and it should be designed and built with uniform planning and guidance. Plans for the automation of the electric power networks are a part of plans for the power grids, and they should continually be revised as the grids develop, and they should be included as a design project like the automation of the power plants and stations. Automation of the power grids should also be considered in combination with information management and off-line computations.

2. The Problem of Controllability of Equipment

When considering automation, we must first solve the problem of the controllability of control equipment. For example, the valves of the power plant and the knife switches of substations must be remotely operable so that the safe and economical performance of generators, furnaces and auxiliary equipment can be monitored and controlled using several parameters (such as temperature, pressure, position, speed of rotation).

3. The Problem of Domestically Manufactured Automated Equipment

In the electric power industry in recent years, domestically manufactured automated equipment has been of poor quality and low reliability; there has been a severe shortage of accessories, and the rate of operation has been low. The manufacturing plants must solve these problems. We can use such measures as imitating foreign products and introducing technology to hasten progress and import some selected spare parts which cannot be produced domestically at this time.

4. The Problem of Using Computers

Now, the rapid progress in automation technology is inseparable from the development of computer technology. The use of computers is undoubtedly the direction to follow. The present problem is that we do not have a sufficient grasp of computer technology, from scientific research to operation, and the performance and especially the reliability of domestically manufactured computers lag far behind those of foreign manufacture. We should advocate the use of computers, we should train technical personnel to grasp this technology better and solve the quality problem of domestically manufactured computers.

Because we must gradually seek to understand computer technology and improve the quality of computer equipment, we are still in a process of improvement, and when considering the question of using computers, we must consider the following principles:

(1) Hydroelectric power and thermal power plants and power grids can use computers for routine testing and recording, summation of power, overload warning, compiling operations records, providing operational guidance and other such monitoring functions. Even at present when the computer is not very reliable, definite results can be realized.

(2) In the controlling operation, it is best to let the computer control localized single operations, and as the reliability of the controlled equipment and the reliability of automated components improve, gradually each single operation can be remotely controlled, and then the computer can monitor and command such operations.

(3) Localized single operations can be individually fitted with a microprocessor on a trial basis to realize gradual numerical control.

(4) We can utilize currently the available computer situation or micro-processors which do not require a lot of money to develop automation software, including automation of management.

(5) In man-machine links, we should strive to use Chinese character plans.

In modern methods of automation, a very important aspect is the link between man and machine (i.e., an operator uses a keyboard or a light pen and such tools to write out commands or questions on a screen, the computer reports the execution, or answers the question on the screen). This is one of the key points in having automation technology better serve man and realize practical results. Man-machine conversation must be widely utilized in the power grid dispatching center, on the control panels of steam turbine boilers and hydroelectric power plants, and especially in the various business management tasks in the electric power industry. "Man-machine links" in English cannot be popularized widely in our country.

The Chinese character system for questions and answers on CRT screens is at present very incomplete. Many plans have been proposed domestically. We should grasp those plans which we hope will be most useful for selective use and implementation in the electric power industry so that we can establish a unified Chinese character plan early.

(6) The problem of shifts with only a few persons on duty and unmanned shifts.

The reduction of the number of people on duty is a necessary result of automation. We can realize unmanned shifts at hydroelectric power plants and substations. But in the direction of development of automation, we must clarify the following points:

(a) Our purpose in automating is to improve operational safety, economical performance, and the operating condition. Whether practical results can be realized depends on the situation in the nation and feasibility studies must be conducted. We should not simply consider whether automation will reduce personnel.

(b) We must assign sufficient hardware and software personnel. In particular, software manpower is more frequently needed than hardware manpower. By realizing cooperation between the same types of machines we can reduce software personnel. Therefore, we should consider the problem of standardizing the computer models within one region or one system.

(c) When the hardware and software become truly reliable and after a long period of tests, we can appropriately consider reducing the number of people on duty. But we must carefully consider the situation when we progress from "one-man shifts" to withdrawing the last person. Frequently, the percentage of shutdown of the generators at hydroelectric power plants operating during unmanned shifts is higher than that during manned shifts. For example, interruption of the supply of cooling water for the bearing oil of the hydraulic turbine generator can be handled during a manned shift after a warning is issued and the generator need not be shut down. If this occurs

during an unmanned shift, the generator must be shut down. Therefore, in drawing up operations plans, the "percentage of usability" of the generators must be underestimated.

II. Automation of Hydroelectric Power Plants

Automation of hydroelectric power plants is the important material foundation for the utilization of hydraulic energy and, in the process, of hydroelectricity production. It has an important meaning in the safe and economical operation of the power station itself and in reducing the labor intensity of operating personnel. In addition, in most cases, automation of hydroelectric power plants is also an important component of the automation of the electric power system. It also serves an active function in the normal operation of an electric power system and in the operating and working conditions during accidents.

Although during different historical stages in the development of the hydroelectric power plant, the import of automation for hydroelectric power plants changes in meaning, generally, the following technical and economic results can be realized.

1. Safety

(1) Automation can monitor and control safety in the operation of the generators and electrical equipment of hydroelectric power plants and improve the level of safe operation of hydroelectric power plants.

(2) Automation can monitor and measure safety parameters of dams and structures of a hydroelectric power plant and guarantee that they operate safely.

(3) Automation can improve the quality of electric power of the electric power system and serve an active function to guarantee that the electric power system operates safely.

2. Economical Performance

(1) Automation can comprehensively utilize water conservancy, economically dispatch hydraulic power, and fully develop the economic benefits of hydraulic resources to the maximum extent.

(2) Automation can combine the generators for best operation of a hydroelectric power plant and realize the best load distribution among the generators.

(3) Automation can create conditions for automatically realizing economical dispatching in the electric power system.

3. Labor Saving Aspects

(1) Automation can improve the working conditions of operating personnel, reduce labor intensity, and improve the labor production rate.

(2) Although at the present stage, we are not pursuing the goal of unmanned shifts, still, for medium and small hydroelectric power plants in remote areas where living conditions are difficult and transportation is inconvenient, reducing the number of personnel on duty has important meaning.

The technical policies for automation of hydroelectric power plants are as follows:

1. The goal of automation of hydroelectric power plants should be to utilize the sources of hydraulic energy to the greatest extent, improve the level of safety, the economical operation of hydroelectric power plants and the electric power system, the level of technical management, and the labor condition of operating personnel.

2. The principle of technical development of automation of hydroelectric power plants should be based on our country's situation. We should develop the advantages and avoid shortcomings, start out from the actual situation, and suit measures to local circumstances. We should strengthen the work of rebuilding for basic automation, improve the level of automation of single units of machinery, carefully establish test points for the application of new automation technology to realize practical results and to popularize them rapidly.

3. The technical policies for the automation of hydroelectric power plants should take into consideration the following aspects:

(1) Newly built power plants should be treated individually according to different situations.

In planning and designing new hydroelectric power plants, we should propose varying demands for the scope of automation, the goals, the import, the structure and the format according to the capacity, characteristics, and position of these new plants in the system.

Large hydroelectric power plants should generally have a higher level of automation in real time information gathering and processing, centralized monitoring and control of operations, safety analysis, accident handling, monitoring and measuring parameters of large dams and the economic operation of the reservoir and generators. We can decide whether to adopt computer control by using technical and economic comparisons and proofs.

Medium hydroelectric power plants can use the regular return data screen and the centralized monitoring and control panel for centralized monitoring and control. But we should match it with a more complete single machinery automation system with advanced performance indicators.

Small hydroelectric power plants should use ordinary centralized control based on improving the level of basic automation and guaranteeing conditions for reliability of automated single machinery units.

When cascade hydroelectric power plants show more visible economic results, proved technically and economically, they should strengthen the telekinetic communications links between the stepped stations. We may consider using computer control to realize remote centralized monitoring and control of each step station and joint dispatching. For power plants with poor geographic conditions, we should consider not assigning permanent personnel for duty.

(2) The expansion and technical improvement of power plants already in operation should start out from the actual situation and suit measures to local circumstances.

The improvement of the level of automation of hydroelectric power plants already in operation cannot become "large, new, complete" facilities. We must avoid "eliminating almost everything and changing almost everything". We should fully develop the function of the original automation system and equipment as much as possible. We should especially strengthen the work of improving the level of basic automation and we must guarantee that the success rate of automatic operation is over 99 percent.

(3) We must fully reorganize, bolster and improve the performance of automated components.

We should solve the main existing problems, improve reliability of performance of components and the percentage of accurate maneuvers, strengthen the development of new components and the rebuilding of old components.

(4) Automation of hydroelectric power plants must adapt to the development of the electric power system and must be coordinated with the requirements for automation of the system.

III. Automation of Thermal Power Plants

Automation of the production procedure of thermal power plants is a necessary result of the development of production technology. The structure of the main and auxiliary generators of units of the intermediate reheating type with a large capacity and high parameters and the thermal system are very complex. The correlation between the parameters is very close, there are more visible aspects to be monitored and operated. The operational aspects of a 300,000-kilowatt generator number about 300, and there are about 1,000 aspects to be monitored. In the course of starting up and shutting down the generator and in changing the operation of the generator, massive monitoring and complex operations are required. Occasional neglect could possibly cause an accident and serious economic loss. Only by using automation technology accurately to test, monitor and analyze the operating condition of the generator and realize automatic operation, control and adjustment can the safe and economical operation of the generators and the power plant be guaranteed.

The technical policies for the automation of thermal power plants are as follows:

1. Our country's large and medium thermal power plants generally use single unit centralized control, but the percentage operated by automatic devices is

not high. The direction of future development and future tasks should be gradually to improve the level of automation of thermal power plants.

2. Newly built thermal power plants should strive for different degrees of automation aimed at different requirements. The level of automation of thermal power plants should be considered on an overall basis when designing and construction begin. The arrangement must be rational. We must base our consideration on the predetermined operating condition of the power plant to determine the corresponding level of automation and the method of control.

3. Automation of thermal power plants must start from the beginning and emphasize practical results. The main purpose of automation of thermal power plants is to improve operational safety and economical performance of electricity generating equipment, guarantee safe generation of electricity, realize energy conservation and appropriately improve working conditions.

4. Large capacity generators of over 200,000 kilowatts should use centralized control of unit generators, furnaces and electric power units to realize a more perfect automation of the generators. Start-up and shutdown of the generators should use programmed control techniques and complete automatic linkage, locking and protective measures.

Generators of 100,000 kilowatts or 125,000 kilowatts should use centralized control of unit generators, furnaces and electric power units as much as possible. Local technological systems can use programmed control.

5. The application of computers to realize comprehensive automation of thermal power plants is an important direction to improve the level of automation of thermal power plants. On the basis of the test points established in old plants during the 1960's and 1970's and on the basis of absorbing the technical experience of imported projects, it is necessary to select one or two newly built large thermal power plants as further test sites to develop the application of computers in the automation of thermal power plants. The test site projects should be established in power systems which are technically stronger and which have a higher level of production management; and more reliable computers should be used. We should strive to summarize the operating experience to realize the use of computers for safety monitoring and control at thermal power plants proved in operation.

6. Because of the rapid development of computer technology and the widespread application of microcomputers, it is not necessary to continue using large routine inspection and testing devices in thermal power plants.

7. The basic automation equipment must possess a higher reliability. This is a prerequisite to the realization of automation of thermal power plants. Effectively to realize automation of thermal power plants, in addition to relying on the manufacturing plants of the National Instruments Bureau system and continually to improve the reliability of the basic equipment of automation, the electric power departments should also arrange forces to develop some specialized basic automation equipment for use by thermal power plants, fill the gaps and complete the accessories, and stimulate the rapid improvement of reliability.

8. The controllability of main and auxiliary generators and the thermal system of thermal power plants is relatively poor. This hinders the realization and the development of automation of thermal power plants. The equipment manufacturing departments must continue to improve manufacturing quality, controllability of equipment and provide necessary material conditions for the automation of thermal power plants.

9. We should actively develop technical research in the reliability of automatic devices and their systems. We should aim at the special conditions of thermal power plants to develop experimental research in environmental adaptability of automatic devices, strengthen research forces and provide necessary means for testing.

10. To guarantee the accuracy of instruments for production use, we should clearly understand the standard transmission system for heat engineering measurements by the electric power departments and establish heat engineering measurement laboratories.

11. We should establish and make sound regulatory systems and technical regulations concerning the automation of thermal power plants, and technical standards for automated equipment.

12. We should analyze, study, digest, absorb and popularize the application of automation technology of imported thermal power generators, and change the situation of automation of our country's thermal power plants.

13. The automation system of existing thermal power plants should be reorganized, including the reorganization of equipment, technical reorganization and management reorganization. We should improve the proportion of qualified heat engineering instruments, the proportion of operation of automatic regulators, improve the level of management of production technology so that the automated system can operate normally and develop the benefits it should produce.

14. Improving the technical standard of operating personnel is an important factor in consolidating the achievements of automation of thermal power plants and in promoting continued development. We should draw up plans, prepare to build a nationwide training center for operating personnel of thermal power plants, and use computer simulated training systems.

15. We should organize people in scientific research, education, designing, manufacturing, capital construction, and operations departments, develop the enthusiasm of central and local administrations in joint efforts to hasten the development of automation of thermal power plants.

IV. Automation of Dispatching in the Power System

The characteristic of electric power production is that power generation, transmission, distribution, transformation and consumption are accomplished continuously and instantaneously. Power generating stations, substations and users are scattered within a broad power supply area and linked by a power

transmission and distribution network. From the systems engineering viewpoint, this is a very complex "large system". There are strict mutually limiting conditions. Load variations and accidents occur randomly. Thus, it is difficult to adapt to the situation by simply relying on increasing personnel to handle dispatching. Generally speaking, a 10 million-kilowatt capacity power system requires more than 2,000 pieces of information. Obviously, in a system with such a large amount of information, it is impossible to imagine relying only on efforts of dispatching personnel to monitor, carry out comprehensive analysis and make correct judgments. In case of accidents, it is more difficult to make immediate decisions and implement emergency measures. Therefore, establishing an automated monitoring and control system for dispatching, with the digital computer at the core, is very necessary.

Production safety of a power system is essential. In normal situations, the operating state of major equipment must be monitored, and precautionary measures must be implemented. When an abnormal situation occurs, normal operation can be restored. When an accident occurs, measures should be implemented, the accident should be prevented from spreading and the system should be restored to normal operation as quickly as possible. This series of effective measures is very difficult to accomplish by the manual telephone dispatching of the past. At present, foreign power systems use automated monitoring and control systems for dispatching to assist execution, and work in this aspect has already realized visible achievements and progress.

After safe operation is satisfied, the normal operating task of the power system will guarantee economical operation. We want the cost of power supply (or consumption of coal) of the entire system to be the lowest. The economical operation of a large power system is also very complex. This is because it involves such complex technical problems as optimal dispatching of the reservoir, economical operation of the power plant, economical load distribution of hydroelectricity and thermoelectricity, and correction of loss in the network. There is a lot of data and computations which are difficult to compute manually. We need the help of digital computers to carry out computations and distribution of data. The benefits from automated economical dispatching realized by the power system is also sizable. For example, if a 10 million-kilowatt capacity power system conserves 0.5 to 1 percent of its total coal consumption, each year, it could conserve 150,000 to 300,000 tons of standard coal, and converting the savings to renminbi, they would reach 6 to 12 million yuan. According to this calculation, the investment in automation could be recovered within several years.

The quality problem in electric power production mainly refers to keeping the frequency of the system and the voltage levels at the central points within the allowable specified range. This is because the quality of electrical energy directly affects the quality of other industrial products and the production rate of the entire industry, therefore it is also very important. Their automatic control can also be realized by the automatic monitoring and control system for dispatching.

In keeping with production growth and continued power system expansion, there are now five interprovincial joint systems throughout the country and many provincially administered power systems. In the future, it is possible to link them into a unified nationwide power system. According to the characteristics of electric power production and the requirements for safety and economical operation, gradually realizing automation of dispatching of the power systems is a necessity.

The technical policies for automation of dispatching in a system are as follows:

1. The automated monitoring and control system for dispatching in an interprovincial joint power system should be coordinated with the administrative dispatching and management system. Of course, the administrative dispatching and management system should also manifest the superiority of the large power network.

2. When deciding on an automation project for dispatching, we must first make overall plans well. Because the power system itself is very complex, and because many specialized technologies are involved when carrying out automation of dispatching, for example, communications, telekinetics, automation, dispatching, protection, plant and station operations and computer technology and such specialized technologies, we must carry out overall planning so that we can make unified plans and take everything into consideration and coordinate every aspect before a complete automated monitoring and control system for dispatching can be built. Generally speaking, it is actually a large systems engineering project.

As we take into consideration that the power systems are continuing to develop, planning for automation must be coordinated with the long-range plans of the systems so that the designed automatic monitoring and control system will be suitable for the next 10 years and more.

3. The whole system should establish a complete and reliable communications and telekinetic information network. This is necessary for normal dispatching management. The automatic monitoring and control system for dispatching has an even more rigid requirement for this network. Its importance is more obvious especially during accidents. The available old communications and telekinetic equipment must be fully utilized. When adding new equipment, we can gradually use new technology (such as digital communications and microprocessor telekinetics, etc.). The new and old equipment must be uniformly considered and arranged. In addition, in improvement projects, investment in communications channels will constitute 70 to 80 percent of the total investment in automation. We must conscientiously consider this.

4. We must emphasize basic automation of plants and stations, especially automation of heat engineering tasks of thermal power plants. Because the level of basic automation of our country's power plants and stations is low, and operational maintenance is poor, we must further investigate and study, draw up improvement plans, and include them as technical improvement projects to be completed according to schedule, year by year, to adapt to the requirements of automation plans.

5. Automation of newly built plants and stations must satisfy the automation requirements for dispatching through the system. Before completion of capital construction projects and before they begin production, we must finish building a complete and reliable communications and telekinetic system (including upward and downward channels) connected to the dispatching center. The controlled plants and stations must possess facilities suitable for the reception and execution of dispatching control information, such as automated facilities needed for frequency modulation, voltage regulation and remote control. We should recognize that after 10 years, the proportion of new plants and stations will constitute the most part of the entire system. If we have created good conditions for basic automation in capital construction projects, they would be very beneficial to the implementation of automation of dispatching in the system. The automation projects required by plants and stations to be built as capital construction projects should be studied as specific topics, and after regulations have been drawn up, they should be handed over to the designing units to be incorporated in engineering designs for capital construction.

6. The computers selected for use in the automation of dispatching in a power system are required to operate continuously 24 hours a day. According to the present production standards in our country, we can set the rate of usability of the dual computer system at 99.0 to 99.5 percent (internationally this has already reached 99.9 percent). At the same time, we should have complete systems software.

7. The automatic monitoring and control system for dispatching should gradually complete the following functions according to our country's actual situation:

(1) Safety Monitoring (SM). On the basis of building a complete and reliable communications and telekinetic network, the automatic monitoring and control system should gather and process a massive amount of operating information. The operating condition of the power network should be displayed on a color screen for safety monitoring, for example, monitoring the summation of power, overload warning, compiling operating records, trend analysis, accident order recording, and performing tabulation and printing functions.

(2) Automatic Generation Control (AGC) and Economical Dispatching Control (EDC). On the basis of completing load forecasts, start-up and shutdown plans for generators and off-line economical load distribution and such functions, the automatic monitoring and control system should carry out on-line automatic generation control and economic dispatching control, automatic control of adjustments of power plants, guarantee the quality of frequency and economic operation, and nonadjustable power plants can be manually adjusted according to the daily load curve. Economical operation should also include the economical distribution of hydroelectricity and thermoelectricity and correction of line loss.

(3) Safety Analysis (SA). The automatic monitoring and control system should carry out preliminary safety analysis of the power system via state estimation, (SE), on-line flow analysis (OLF), case estimation (CE), and stationary safety

analysis (SA) and such procedures. For example, if a large capacity generator or an important line in the system jumps a switch, the automatic monitoring and control system should analyze and inspect whether there is an overload and whether the frequency and the voltage have exceeded their limits. The remaining tasks, such as emergency control (EC), optimum power flow (OPF), automatic systems trouble analysis (ASTA) and such higher level functions can be research topics. In addition, to realize the above functions, we must study such support software for data bank management and man-machine systems.

8. The overall planning for the automation of dispatching in a power system should be grasped by a special team organized mainly by the system itself. Engineers of such specializations as communications, telekinetics, automation, computer and power grid dispatching should be organized and included. They should carry out investigative research and propose detailed plans and general requirements, and then hand them over to the construction contractor. During the course of construction, essential personnel must stay with the project to the end. This will be advantageous at the official start of operation in the future. The plans should include training programs to train various specialized personnel. Attention must be paid to training computer software personnel. This is because the automatic monitoring and control system for dispatching requires personnel of higher technical levels to grasp and develop it.

V. Automation of Information Management

As the scale of modern electric power production expands and technology develops, management must also be modernized. Modernization of management will make it possible to utilize accurate, overall, timely and processed and analyzed information and data to help make managerial decisions. If managerial decisions are not accurate or cannot catch up with the needs, there will be delays, errors in work, and great economic loss will be the result. If management work is done well, work efficiency can be improved, errors can be reduced, and the modernization of the electric power industry can be realized promptly. Therefore, every developed foreign nation has placed management modernization and automation of information management as the most important task, and has widely applied them in actual situations. Widespread application of the computer has also brought about major reforms in management and has greatly pushed forward the development of the electric power industry. It can be foreseen that if computers are widely used on an overall basis in our nation's electric power departments to carry out information management, there will be great economic benefits for our nation and our nation's electric power industry will move forward on a brand new path. This is also the demand placed upon us by the major scientific research tasks determined by the State Scientific and Technological Commission. Its significance is very important.

1. Foreign and Domestic Situation

Foreign electric power companies have long had the experience of using key punch machines to manage bills and consumer accounts. After the advent of the computer, it was applied by the electric power industry first in the

management of bills and consumer accounts. Subsequently, it was quickly applied in various managerial tasks, including massive computations in planning. Now, in the management of business documents, designing blueprints, engineering construction, finances, personnel, and warehousing, the computer is being used by all as a data processing tool.

Many governments and their departments, companies and enterprises, tourism and transportation, banking and financial institutions, businesses, hospitals and schools have long used the computer to carry out management and the scope of application is developing in depth. In the United States and Japan, 70 to 80 percent of the several hundred thousand computers are used in management work. The Soviet Union uses the computer to plan and manage the whole nation's 3 to 4 million types of industrial and agricultural products. They have established many modern management systems consisting mainly of computers and based on the needs of users.

Our nation's electric power department now has 120 computers. This is a fairly large number among civilian industrial departments. These computers are distributed in each province and are used by scientific research, designing, production and operations departments. For several years, they have done a lot of work in off-line engineering calculations and on-line safety monitoring. A group of technical personnel engaged in computer work has also been trained. But in the application of the computer in business management we are only beginning. Computers have performed a small number of tasks in compiling production statistics, calculating electricity fees, calculating wages, and load forecasting. Recently, all sectors have emphasized this problem, and because the computer is now more popular than before, and with the advent of microcomputers and various types of terminals, there are favorable conditions for the use of computers in management. It seems that at present, there is a trend toward rapid development.

2. Content and Goals To Be Realized

The content of modernization of management in the electric power departments mainly includes the following:

(1) Management of electric power production. This includes daily reports on production, 10-day reports, monthly reports, annual reports and statistics, statistical analysis of technical and economic indices of operation, fuel distribution.

(2) Safety management. This includes statistical analysis of accidents, monitoring the safety condition of equipment, scheduling inspection intervals and inspection and repair plans.

(3) Management of electric power supply and consumption. This includes the analysis of consumption of electricity by users, load adjustment and distribution, installation, maintenance and management of power supply and consumption equipment.

(4) Management of electricity fees. This includes the calculation of electricity fees of large power users and management of electricity prices.

(5) Financial management. This includes financial plans, capital distribution, estimates for engineering projects.

(6) Material management. This includes distribution of equipment, warehouse management, best inventory decisions, statistical analysis of material consumption and management of equipment production plans.

(7) Asset management. This is the compilation of statistics and management of the current assets and equipment of the electric power departments.

(8) Planning management. This includes development forecasts, selection of the best plans, selection of the best investment results, and managing the implementation of plans.

(9) Engineering design management. This includes the modernization of the means of designing, computer graphics, management of blueprints, budgeting, and best management of design flow processes, and application of the key route method.

(10) Engineering construction management. This includes the application of the key route method in organizing plans for engineering construction of large hydroelectric power projects, thermoelectric power projects, power transmission and transformer projects, selection of the best pole positions for power transmission lines, supply and distribution plans for circuit and tower equipment, and modernization of management of other types of construction.

(11) Business management in factories. This is the internal business management of equipment manufacturing plants.

(12) Scientific research management. This includes scientific research planning and processing data of scientific research achievements and scientific research experiments.

(13) Management of scientific research information. This includes searching for books and information.

(14) Management of wages. This includes management of the labor production rate, management of quotas and management of wages.

(15) Personnel management. This includes personnel statistics and file searching.

Among the items described above, we must start out with the most needed, go from the easy to the difficult, make breakthroughs at key points and actively popularize them. The goals to be realized in stages are as follows:

(1) We must utilize currently available computers or purchase microcomputers for use within the water conservancy and electric power ministry, power network bureaus, provincial bureaus, power supply bureaus, and scientific research, designing and construction units and select appropriate projects to realize modernization of business management for specific projects.

At present, the Beijing area should fully utilize the H80E and the M-160H model computers so that they can develop the function they should have in modernizing management.

(2) We should prepare to establish local and regional computer networks at places where conditions are favorable (such as the Beijing area, the east China region), realize comprehensive modernization of management so that concerned business departments can utilize this automated management system to complete some of the tasks described above.

(3) We should gradually form a modern management system for the entire nation's electric power departments. This system should be able to gather information from all levels of the electric power departments from top to bottom and realize management of all levels from top to bottom. We should utilize this system to obtain accurate, overall, timely and processed and analyzed date related to the electric power industry to help the leadership and managerial personnel at each level to carry out appropriate decisions and management.

3. The Question of Policy

(1) During the current period of readjustment, we should fully develop the function of all currently available computers, improve their reliability, develop more applications programs so that they can do as much work as possible in management. First we should begin with the most urgently needed tasks of compiling electric power production statistics, accident analysis, management of plans and materials management. To enable currently available computers to adapt to the needs of information management, we should improve their functions. Those computers, which present real difficulty in developing their function, should be carefully and appropriately readjusted.

(2) Computers engaged in information management work should have a time-shared operating function and should be equipped with multiple terminals placed in every business management office so that various business management tasks can be performed simultaneously on one computer. The computers should be convenient for input and output and should have Chinese character display and printout functions. They should also have a very large storage capacity. The computers presently available do not possess these functions. To adapt to the needs of future work, we must consider these requirements when changing to another generation of computers. Also, each power network must internally standardize the computer model, and the whole nation should also unify the computer models as much as possible. This will benefit shared programs and data bank resources.

(3) We must emphasize microcomputers, especially the application of high-grade microcomputers with strong functions in management.

(4) We must emphasize software. The work of compiling programs is difficult mental labor. We should emphasize software, strengthen support of software work, increase investment in development of software. Applications programs for managing information of major significance and higher level information should be encouraged.

(5) In the course of developing automation of information management, there must be close cooperation and joint active efforts by business management departments and specialized computer departments.

4. Related Measures

(1) We should strengthen forces and establish test points for information management well. We should make breakthroughs in key points and lead the general effort well.

(2) The Computer Specialization Committee of the Electrical Engineering Society should hold academic meetings on the modernization of management as the major topic to study how to launch work in this respect.

(3) We should hold learning classes and study classes according to the needs of different business management departments to train talent.

(4) Schools subordinate to the electric power ministry should establish management majors including course material on automation of information management. In the years to come, we should supplement talent in this field in a key way.

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BRIGHT FUTURE SEEN FOR ELECTRIC POWER INDUSTRY

Beijing GONGREN RIBAO in Chinese 25 Oct 82 p 3

[Article: "Electric Power Industry's Prospects Are Excellent"]

[Text] On the basis of worldwide economic development and our own experience, the rate of growth of the electric power industry must be greater than the rate of industry as a whole if we are to assure accomplishment of the immense strategic goals of the national economy and meet the requirement of improving the people's material and cultural life. In 1980 our electricity generating capacity totaled 66 million kilowatts and output was 300.6 billion kilowatt-hours. Output will quadruple in 20 years, and by the year 2000, total national generation capacity should be raised to 260 million kilowatts and output to 1.2 trillion kilowatt-hours.

Quadrupling power output is an extremely difficult task, but we are capable of accomplishing it. We have extensive electric power generating resources. We have 600 billion tons of explored coal reserves, making possible extensive development of fossil-fired power generation. Our hydropower resources are the world's largest, and developable reserves amount to 360 million kilowatt-hours or an annual generating capacity of 1.9 trillion kilowatt-hours; only 5 percent of the reserves are developed, and electric power construction is just now coming into its own. In the last 30 years we have forged a contingent of production personnel with rich experience and a certain technical level who can self-reliantly shoulder the tasks of building and managing technically complex large-scale power stations. More than 30 large-scale fossil-fired power stations are now under construction, with a total installed capacity of more than 10 million kilowatts; more than 20 hydroelectric stations with capacities greater than 100,000 kilowatts are under construction, with a total installed capacity of 10 million kilowatts. In addition, hydroelectric and fossil-fired electric power stations with capacities in the tens of millions of kilowatts have now passed through the survey and design stage and are ready for construction. All of the above are our country's favorable conditions.

Most of our country's hydropower resources are in the southwest and northwest, while most of the coal resources are in north China, Shanxi, and Nei Monggol. In view of this situation, future hydropower development must concentrate on development of large power stations on the main stream and tributaries of the

upper and middle Huang He and Chang Jiang and the Hongshui He basin (another name for the upper Xi Jiang in the northwest of the Guangxi Zhuang Autonomous Region); we must institute eastward transmission of western electric power and use high-voltage transmission lines to transmit electric power from the upper and middle Hunng He to the Beijing-Tianjin area, from the Gezhouba and other hydroelectric stations on the Change Jiang to the Shanghai-Nanjing area, and from the Hongshui He to Guangzhou, producing a large supraregional network. To couple fossil-fired electric power generation with coal extraction, the construction of coal-electricity bases should be accelerated and large mining district fossil-fired stations should be built in the major coal districts of Shanxi, Nei Monggol, Anhui, Henan, Shandong, Shaanxi, Guizhou, and Heilongjiang. In addition nuclear power stations should be built in areas such as south China, east China, and the northeast where energy reserves are lacking, middle-sized hydroelectric stations should continue to be built along the coast of the northeast and southeast, and small-scale hydroelectric stations should be built where suitable in the countryside.

The blueprint for development of our country's electric power industry shows us excellent prospects.

8480
CSO: 4013/51

POWER NETWORK

SHIJIAZHUANG-TAIYUAN 220KV POWER LINE PROJECT FINISHED

Taiyuan SHANXI RIBAO in Chinese, 17 Dec 82 p 1

[Article by Jia Jinlong [6328 6855 1429], Wang Shiyi [3076 1102 5030], and Han Jianping [7281 1696 1627]: The Shijiazhuang-Taiyuan Power Line Project Linking Second Circuit to Power Grid Has Been Completed"]

[Text] The power transmission line of the Shanxi section of the project to link the second 220,000-volt circuit through Niangziguan was completed on 10 December.

This line starts from the northeastern substation of Taiyuan and ends at the Guotongye Substation in Shijiazhuang City. The entire length is 238 kilometers. Besides the 130 kilometers from Yangquan to Niangziguan which had already been built, the remaining 108 kilometers were designed and constructed this year.

This line is a key project for power transmission in the north China region. Its completion and its start of production will play an important role in utilizing Shanxi's energy, improving the capacity of transmission of the North China power grid, and in increasing the capability to supply power to the Beijing-Tianjin - Tangshan area.

The Shanxi section of this line extends 110 kilometers from the northeast substation of Taiyuan to the Changling Substation in Yangquan. The line crosses inumerable valleys and mountains of the Taihangshan. The design and construction were very difficult. The provincial power bureau placed this project at the foremost position in capital construction and unified command and leadership. The Central Shanxi Power Bureau in charge of construction closely coordinated the construction units, provided blueprints and information for construction, allocated funds for construction, contacted and organized construction blueprint estimates and reviews. The bureau's leadership went to the front line to solve difficult problems and to pave the way for construction units. The engineers and technicians of the Provincial Electric Power Design Institute braved wind, snow and bitter cold in surveying, in Taihangshan, made the best selection for the location of every tower, and quickly provided construction blueprints and information. The Electric Power Engineering Team of the Linfen Electricity Bureau was responsible for constructing the 53.3 kilometers of the line from

Taiyuan to Shouyang. They organized manpower, equipment, and material preparations before construction, held various technical training classes for various jobs, examined on-site operations, tested the grades of concrete, and established a method for rewards and penalties for quality control. During construction, new technology was used in laying the foundation for and in erecting the towers. This guaranteed the towers would stand straight and made assembly quicker. The engineering team of the Provincial Power Transmission and Transforming Company was in charge of constructing the 56.7 kilometers of line from Shouyang to Yangquan. They established detailed rules on quality management. During construction, the company leadership led technicians to the site to direct the work, and they guaranteed quality and progress in all aspects.

To complete construction early, the electric power construction team of the Linfen Power Bureau in charge of the Taiyuan-Yangquan line and the engineering team of the Provincial power Transmission and Transforming Company competed against each other and assisted each other. In the competition, they exchanged information, understood each other's difficulties in construction, and helped solve the difficulties in time. Both teams completed their construction tasks 2 and one-half months ahead of schedule.

9296
CSO: 4013/106

SHANXI POWER INDUSTRY WORKS HARD TO COMPLETE KEY CONSTRUCTION PROJECTS

Taiyuan SHANXI RIBAO in Chinese 7 Jan 83 p 1

[Article by Tai Jinzheng [6733 6855 6927]: Electric Power Construction Workers Exert Efforts To Complete Key Engineering Projects and To Start Production"]

[Text] The electric power construction workers throughout the province worked hard to victoriously complete the capital construction tasks handed down by the state for 1982 and added new productive capabilities to the electric power industry.

In 1982, the state gave our province a sum of 208.34 million yuan as investment in electric power construction, an increase of 50 percent over the previous year. To complete this difficult task victoriously, the Provincial Electric Power Construction Bureau overcame difficulties of receiving the investment late, of a tight schedule and heavy tasks, uniformly transferred and assigned construction forces, uniformly arranged the progress of each project, carefully organized, scientifically managed, and carried out construction in a civilized manner, enabling the No 4 generator at Niangziguan, constructed by the Third Construction Company of the Provincial Electric Power Construction Bureau, to join the network and generate electricity on 13 September, 109 days ahead of schedule. By the end of the year, it had already generated over 100 million kilowatt-hours. The quality of this generator is one of the best among the generators built in recent years. The power transmission line of 118 kilometers for the electrified railroad from Yangquan to Taiyuan built by the Provincial Power Transmission and Transforming Company was completed in September of last year and has joined production. It has guaranteed that the electrified railroad between Shijiazhuang and Taiyuan will be open before national day, and it has made an outstanding contribution to the capability of exporting Shanxi coal via the Shijiazhuang-Taiyuan railroad. At the same time, a group of key projects under construction will also be completed one after the other according to plan. The first generator of the Second Datong Power Plant project is expected to begin production in 1984. Eighty-five percent of the basic work of the first 500,000-volt power transmission and transformation line project from Datong to Fangshan in the North China region have been completed. The quality has reached the nation's advanced level. The 110-kilometer power line project of the 220-kilovolt link with the power network from Shijiazhuang to Taiyuan has already been completed, and a part of the line can begin production during the first quarter of 1983. After this project begins production, it could increase the power transmission capability from our

province to the Beijing-Tianjin-Tangshan Power Grid by onefold.

In 1982, our province's electrification of rural areas also saw new progress. The electric power department built 497 kilometers of 35-kilovolt and 10-kilovolt rural power transmission and transformation lines in order to hasten the progress of electrification of farm villages, and an additional 12 communes, 136 brigades now have electricity. The use of electricity in 30 counties improved. Up to the present, 97 percent of the communes and 77.6 percent of the brigades throughout the province have electricity. Over 1,800 kilometers of the 35-kilowatt and 10-kilowatt power lines of farm village power grids have been improved. Over 390 transformers were newly installed, and they have increased the reliability and economic benefits of power supply to some counties and communes.

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CSO: 4013/115

POWER NETWORK

NINGXIA POWER BUREAU REDUCES CONSUMPTION, IMPROVES EFFICIENCY

Yinchuan NINGXIA RIBAO in Chinese, 2 Jan 83 p 2

[Article by Zhao Jingquan [6392 2529 3123]: "Careful Calculations To Reduce Energy Consumption; Developing Potential To Generate More Electricity"]

[Text] The regional electric power bureau emphasized economic results in reorganization of enterprises, and generally completed the various economic and technical quotas for 1982 ahead of schedule. By 7 December, it had generated 1.95 billion kilowatt-hours of electricity, an increase of 7 percent over 1981, and realized a profit of 46 million yuan, an increase of 10.57 percent over 1981.

Since last year, the whole system of the regional electric power bureau launched activities against waste in an effort to conserve energy and increase results. At the beginning of the year, when they planned the whole year's production, they clearly proposed to view conservation of coal and electricity as important subjects to improve economic results and to rationally organize production. Each power plant and electric power supply bureau mobilized workers and launched activities to conserve coal and conserve electricity on a large scale. The Shizuishan Power Plant conducted major overhauls and worked to improve the efficiency of power generating equipment. Consumption of coal per kilowatt-hour of electricity dropped from the planned 488 grams to 472 grams. At the same time, it worked to reduce the amount of fuel oil used and this effectively reduced the cost of generating electricity. Zhongning Power Plant insisted on launching competition in small indices. It divided the economic consumption indices of the whole plant into 27 small indices and issued them to each subsidiary yard. Each yard was evaluated by the month. Each season, the plant conserved over 190 tons of fuel coal and also generated more electricity. The Yinchuan and Yinnan power supply bureaus further strengthened management of line loss, made theoretical calculations of line loss by line and by voltage and evaluated them. At the same time, it built a network, rebuilt power transmission and transforming equipment that consumed a lot of power, improved the power transmission capabilities of the power network and reduced network loss.

Greatly developing economical dispatching by considering the "whole network as one chess board" is an important way to realize better results in the electric power industry. This bureau calculated that generating 1,000 kilowatt-hours of hydroelectricity costs 16 yuan less in fuel than thermal electricity. Therefore, they maintained the normal water level in the reservoir, and established a method of rational power network operation after overall balancing, and fully utilized hydraulic energy to generate more electricity. During the latter period after the flood season last year, incoming water from the upper reaches of the Huang He was more plentiful. The central dispatching station took this favorable opportunity to operate the hydraulic turbine generators more and cut back the output of thermoelectric generators. When the incoming amount of water dropped, thermoelectric generators were ordered to operate more, and high efficiency generators were utilized as much as possible to generate electricity. Because each productive link in the power network coordinated closely with each other, last year, nearly 100 million kilowatt-hours of hydroelectricity more were generated, conserving 1.5 million yuan in fuel costs.

9296
CSO: 4013/102

SERIOUS ACCIDENTS FORESEEN IF CENTRAL CHINA POWER GRID NOT OVERHAULED

HK030511 Hong Kong MING PAO in Chinese 2 Feb 83 p 5

["Special dispatch from Shanghai": "Central China Power Grid Out of Balance; Wuhan Steel Corporation Equipment Threatened"]

[Text] In recent years, the central China power grid has not been able to exercise effective control, and excessive consumption of power has been extremely serious. The power grid has been operating at low cycles and breakdowns of equipment have occurred on many occasions. Experts have called for a prompt reversal of this situation. Some oversights may cause a serious accident at any time. If a major accident happens, the equipment in the Wuhan Steel Corporation will be damaged.

The central China power grid was linked in 1979 between Hubei and Henan following huge power consumption by a rolling mill of the Wuhan Steel Corporation. In order to run the power grid well and put it under unified management, the Central China Power Management Bureau was set up in 1980. In recent years, power consumption has risen very quickly in both Hubei and Henan, exceeding by a great margin the growth of electric energy production.

According to an estimate by the Central China Power Management Bureau, there was a shortage of about 800,000 kw of electricity last year and about 100 million kwh of electricity every month, 10 percent less than the required amount. In view of this situation, the Power Management Bureau stepped up planned supply of power. However, the power consumption departments in both provinces refused to execute the plans of the Power Management Bureau by stressing their difficulties and practical needs. Some departments repeatedly topped the quotas. As a result, the normal cycle of the power grid has dropped from 50 to the abnormal level of below 49.5 cycles. It has even reached 48.5 cycles at its lowest level. This is extremely dangerous.

Up to now, this state of affairs has not been rectified. The cycles of the power grid still remain at the dangerous level of 48.5 cycles and the standard rate is 76 percent only.

The cycle is an important criterion for judging the quality of power supply. In China, the cycle of power supply has been fixed at 50, with fluctuations

of less than 0.5 cycle. If a power grid operates at low cycles, the result will be: the output and quality of industrial products will be seriously affected; radio broadcasts will be distorted; electric clocks will not keep good time; and television sets will be out of order. It will even damage electric power equipment and, in serious cases, wreck the power grid, which will result in power failure over a large area. The stability of the cycle is the comprehensive reflection of the balance between power supply and demand as well as the management and technical standards of the power industry.

CSO: 4013/131

POWER NETWORK

GUIZHOU'S SHUICHENG POWER PLANT FEEDS ELECTRICITY TO YUNNAN

Kunming YUNNAN RIBAO in Chinese, 23 Dec 82 p 1

/Article by Shen Xuieliang /3947 1331 5328/: "Shuicheng Power Plant Provides 1 Million Kilowatt-hours of Electricity to Our Province Daily"/

/Text/ Guizhou's Shuicheng Power Plant officially joined our province's power network on the 11th of this month and began operation to provide more than 1 million kilowatt-hours of electricity to our province a day.

The Shuicheng Power Plant in Guizhou Province is a high-temperature, high-pressure power plant at the mouth of a coal pit. It has an installed capacity of 125,000 kilowatts. Its coal consumption is low, its efficiency is high, and it is near the eastern part of our province's power network. It has a 110,000-volt power line running to our province. The power network and the power plant serve as a reserve for each other. As the generators of the Wujiangdu Hydroelectric Power Station in Guizhou begin production one after the other, the electric power of Shuicheng has a temporary surplus. Yunnan's output of hydroelectricity has dropped, and electric power is seriously deficient. Under the care of the Southwest Electric Power Administrative Bureau of the Ministry of Water Conservancy and Electric Power, the concerned departments of the two electric power bureaus of Yunnan and Guizhou provinces negotiated and developed the superior tradition of mutual assistance to overcome the difficulties in power shortage. They decided to include the Shuicheng Power Plant in the operation of the Yunnan Power Network this year and next year and to transmit electricity to Yunnan as much as possible. At present, the daily amount of electricity transmitted to Yunnan is one and a half times the amount provided before the power plant joined the network. This has served greatly to alleviate the pressure on our province's power network to supply electricity in support of agricultural and industrial production.

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CSO: 4013/97

BRIEFS

FUJIAN POWER EXPANSION PLANS--The 12th National Congress has set energy development as one of the most important national goals. This is a wise policy. It was mentioned, for example, that in 1950, installed capacity for electricity generation in Fujian was 7,700 kilowatts, and electricity output was 8.06 million kilowatt-hours. In 1980, these rose to 1.7 million kw and 4.947 billion kwh respectively. Fujian is endowed with rich hydroelectric power resources and it is estimated that the province can develop an installed capacity of hydroelectric power of more than 7 million kw with an annual production of electricity of 32 billion kwh. Today, only 12 percent of that capacity has been developed. However, over the past two decades, through practice and training, the province's ranks of engineers and technicians have grown and the technical level has improved. They have great potential and a great future ahead of them. Hydropower survey and design personnel are determined to carry forward the spirit of hard work and perseverence to complete, before 1990, the first phase of the project to build hydroelectric power stations on the courses of the Jin Xi, You Xi, and Muyang Xi with a total installed capacity of 800,000 kw. Comrades involved in thermal power designing state that in accordance with the objectives of the Party Central Committee, in the next decade a thermoelectric power capacity of 400,000 kw should be installed in the southern Fujian area, along with a 220-kilovolt high-tension power distribution network. This will meet the needs of the transporation sector to electrify the Ying-Xia and Wai-fu railroad lines. Comrades involved in electricity conversion survey and designing state that they will complete designs for 2,000-kilometers of high-voltage power transmission lines and a 2-million kilovolt-ampere substation. [Excerpts] [Fuzhou FUJIAN RIBAO in Chinese 15 Oct 82, p 1]

SHANDONG 1982 POWER OUTPUT--Power plants throughout Shandong Province overfulfilled the 1982 annual power generation plans by 106 million kwh 2 days ahead of schedule for a 4.2 percent increase over the corresponding 1981 period. [Jinan Shandong Provincial Service in Mandarin 2300 GMT 31 Dec 82 SK]

SHANXI 1982 POWER OUTPUT--By 13 December, the provincial power industry had fulfilled gross output value and generation of electric power ahead of schedule. The output value increased by 10.76 percent over the same period last year. Total generation rose to 12.8 billion kwh, an increase of 9.14 percent over 1981. Profits gained this year were over 200 million yuan, an increase of 42 percent over 1981. Gross output value, total generation and profits all hit all-time records. [Tiayuan Shanxi Provincial Service in Mandarin 2300 GMT 14 Dec 82 HK]

LIAONING 1982 POWER OUTPUT--The 48 power plants under the Dongbei Power Administrative Bureau had generated 51 billion kwh of electricity as of 25 December, prefulfilling the state power generation plan by 6 days. Since the beginning of 1982, these power plants have saved 130,000 tons of standard coal and 140 million kwh of electricity. These power plants produced a daily average of 10 million kwh of extra electricity. [Shenyang Liaoning Provincial Service in Mandarin 1100 GMT 28 Dec 82 SK]

HUBEI 1982 POWER OUTPUT--Hubei Provincial Power Department fulfilled the annual quota for generation 23 days ahead of schedule. By 20 December, it had generated 14.4 billion kwh of electricity, 500 million kwh more than the quota. The province's generating capacity this year has increased. This year, the province has also adopted the method of generating more hydroelectricity and less thermoelectricity which consumes more coal, to save energy resources. The province has generated about 1.9 billion kwh of thermoelectricity less and about 2.7 billion kwh of hydroelectricity more in the whole year. As a result of generating 2.7 billion kwh of hydroelectricity, 1.7 million tons of raw coal have been saved. [Wuhan Hubei Provincial Service in Mandarin 1100 GMT 21 Dec 82 HK]

GANSU 1982 POWER OUTPUT--Last year, the Gansu Provincial Electric Power Bureau fulfilled its annual quota for electricity output of 13.25 billion kwh, which was 1.37 billion kwh more than in 1981. Last year, the bureau not only met the needs of power used in industrial and agricultural production in the province but also supplied 2.9 billion kwh to Sichuan, Shaanxi and Qinghai Provinces. [HK251512 Lanzhou Gansu Provincial Service in Mandarin 1125 GMT 15 Jan 83 HK]

CSO: 4013/134

WORK ACCELERATED ON LUBUGE HYDROELECTRIC POWER STATION

Kunming YUNNAN RIBAO in Chinese, 2 Jan 83 p 2

/Article by Chen Ruidi /7115 6904 1717/: "Preparatory Engineering Work for Construction of Lubuge Power Station Progresses Rapidly; Auxiliary Projects Completed Ahead of Plan"/

/Text/ Preparatory engineering work for the construction of the big Lubuge Hydroelectric Power Station has progressed rapidly during the past 6 months. As of 24 December 1982, tunneling on the first diversion tunnel had been completed 10 days ahead of the annual plan. Work on the No 2 auxiliary tunnel of the diversion tunnel completed a total tunneling distance of 500 meters 7 days ahead of schedule. The No 1 steel frame bridge on the upper buttress of the dam site opened to traffic 6 days ahead of schedule. Thus, the preparatory engineering work for the whole power station has entered the stage of overall construction.

The Lubuge Power Station is one of the projects of the "Sixth Five-year Plan". Total designed installed capacity is 600,000 kilowatts, the largest hydroelectric power station in our province at present. Workers of the Huangni He Branch Bureau of the 14th Hydroelectric Power Bureau responsible for the construction task pulled together to launch construction work and actively created conditions to begin construction of the main project as quickly as possible. Workers of the Second Department of Hydroelectric Power were transferred from the Xi'er He power station to the Lubuge site in September of this year. Although conditions for meals and housing were inconvenient, they exerted all-out effort to finish the preparatory work. During the middle 10 days of November last year, they used tunneling machinery to open up the inlet and outlet of the diversion tunnel. After a month of intensive work, they finally completed tunneling 306.5 meters by 4 o'clock on the morning of 22 December of last year. They entered the 1983 schedule 10 days ahead of time and seized time for early interception of flow to build the dam. At the same time, hydroelectric power builders in charge of tunneling the three auxiliary tunnels also respectively completed the tunneling tasks of the No 2 and the No 4 auxiliary tunnels ahead of schedule. The No 1 steel frame bridge connecting traffic between the left and right banks has officially been opened to traffic.

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CSO: 4013/97

PANJIAKOU RESERVOIR AND HYDROPOWER PROJECT DESCRIBED

Tianjin TIANJIN RIBAO in Chinese, 7 Jan 83 p 3

[Article by Li Chengqian [2621 2052 0051] and Xia Zuoyun [1115 0155 0051]]

[Excerpt] Seen from afar, the main dam of the key water conservancy project of Panjiakou is like a huge dragon lying among the peaks of the Yanshan Range and blending into the mountains.

It is located on the main stream of Luan He 10 kilometers above Saheqiao, Qianxi County, Tangshan Prefecture. It can control 33,700 square kilometers of the river valley of the upper reaches. The Luan He has the most abundant amount of water of any river in the north. Its multiple-year average annual runoff reaches 2.4 billion cubic meters. But the variation in runoff between years is large, and the distribution of the amounts of water within the year is also very uneven. Between 60 and 80 percent of the annual amount of rainfall are concentrated in July and August. The peak amount of floodwater is large, forceful and rapid. Flood disasters frequently occur within the river valley, and disaster from drought also occurs frequently. The abundance of water in the Luan He cannot be rationally utilized. After the reservoir was completed, the uneven amount of water will be fully utilized.

This major project consists of a dam across the Luan He and a power station behind the dam. The magnificant dam is 107 meters high and 1,039 meters long, the largest in northern China. The maximum reservoir capacity is 2.93 billion cubic meters. In northern China, it is second only to the Miyun Reservoir. The spillway is an overflow spillway with a total of 18 tunnels. When it discharges floodwater during the flooding season, the floodwater rushes down like a huge dragon coming down the mountain with thunderous roar. At the center of the overflow dam are four bottom tunnels for flood discharge for emergency flood discharge and for emptying the reservoir. The tall power plant structure on the right bank behind the dam stands mightily. It is a mixed hydroelectric power station that combines regular power generation and pumping and storage power generation. Its installed capacity is 390,000 kilowatts. A regular hydraulic turbine generator has a capacity of 150,000 kilowatts, and each of the three pumping and storage generators has a capacity of 80,000 kilowatts. The station is

the largest hydroelectric power station in northern China at present, and it is also the largest mixed hydroelectric power station in the nation at present. To adapt to pumping water by the pumping and storage generator, a river floodgate has to be built 6 kilometers downstream from the dam site to form a lower bay, and a small power station with an installed capacity of 10,000 kilowatts is built on the left bank of the floodgate.

The entire project of this main water conservancy project is planned, surveyed and designed by the Tianjin Surveying and Design Institute of the Ministry of Water Conservancy and Electric Power and is constructed by the Capital Construction Engineers of the People's Liberation Army. Construction is divided into two phases. The first phase construction mainly includes the dam of the upper reaches and the mixed power station. The second phase construction mainly includes the three pumping and storage generators and the lower bay project. The first phase construction began in 1975. Water was stored and benefits realized in 1980. Since 1981, the first generator has joined the power network to generate electricity. It is expected to be completed in 1983. The second phase construction will begin this year.

The Main Panjiakou Water Conservancy Project will provide water, electricity, irrigation, flood prevention and ease of shipping for the people of Beijing, Tianjin, and Tangshan. The reservoir will be able to regulate 1.95 billion cubic meters of water each year. One billion cubic meters of water diverted from the Luan He along the northern line will be supplied to Tianjin City for use by the people in daily living, for industrial production and some for irrigation.

The surging water in the reservoir will be changed to cheap electric power by the hydroelectric power station. The average annual output of electricity will be 560 million kilowatt-hours. It can conserve more than 200,000 tons of coal for the state. The storage generator can use the water turbine as a water pump when there is surplus electric power during the latter half of the night each day and it can draw 10,000,000 cubic meters of water from the lower reaches to the upper reaches into the reservoir. During the peak of electricity consumption, the water is released again through the water turbine to generate strong electric power to increase the proportion of hydroelectricity in the Beijing-Tianjin-Tangshan power grid and to improve the quality of electric power supply.

The flood prevention reservoir capacity of the reservoir is nearly 1 billion cubic meters. It can store floodwaters during the rainy season. The floodwater is regulated by the reservoir, the amount of flow of the peak of discharged floodwater is reduced, and downstream pressure is eased.

The reservoir is also a large fish cultivation farm. As the water level changes, the area of the reservoir surface varies between a maximum of 100,000 mu and a minimum of 37,000 mu. It is estimated that the maximum annual output of fish would be 1,400,000 jin and the minimum would be 500,000 jin. At the same time, it can also be used to develop other cultures. The

completion of the major water conservancy project will also benefit the expansion of shipping. After building the dam, the upstream water level will rise, the navigability will also increase, and coal, mineral products and timber from more of the upstream areas can be shipped downstream to the cities and towns.

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CSO: 4013/106

'RENMIN RIBAO' ON ADVANTAGES OF RURAL HYDROELECTRIC STATIONS

HK231228 Beijing RENMIN RIBAO in Chinese 19 Feb 83 p 2

[Article: "Rely on the Masses in Properly Running Small Hydroelectric Stations"]

[Excerpt] Recent years have witnessed a substantial increase in the number of small hydroelectric stations operated at the local level and by the masses. Up to the end of 1981, the whole country had built more than 85,000 small hydroelectric stations, with an installed capacity of 7.57 million kilowatts and an annual electric energy production of 14.4 billion kilowatt-hours, or the equivalent of one-third of the total agricultural power consumption. Of the more than 2,000 counties throughout the country, one-third have chiefly relied upon small hydroelectric stations for their supply of electricity. Certain mountainous areas, with a relatively large number of small hydroelectric stations set up, have not only provided cheap energy for irrigation, illumination, tea production, tobacco curing and grain processing, but have also made available electricity for radio and television sets and rice cookers.

There is a bright future for the development of small hydroelectric stations. Our country has a vast area, with many mountains and streams. Resources for the operation of small hydroelectric stations are rich and widely distributed. Their reserves, in theory, reach 150 million kilowatts, and exploitable resources come to 70 million kilowatts. More than 1,100 counties can set up small hydroelectric stations with an installed capacity exceeding 10,000 kilowatts. Some counties can also establish such stations with an installed capacity of more than 30,000 kilowatts. We must value these natural resources and fully exploit these favorable conditions, setting up more small hydroelectric stations.

At present, there is a shortage of energy in the countryside. Many peasant households generally use firewood for cooking. According to statistics, there is an annual national consumption of more than 100 million cubic meters of firewood and 500 or 600 billion jin of stalks, representing 70-80 percent of all the stalks. Certain areas have also used large quantities of diesel oil for generating electricity, causing a serious waste of fuel oil and adding to the burden on the peasants. With the establishment of small hydroelectric stations, we can replace firewood and oil with electricity, effecting a great savings in energy. Meanwhile, this helps in protecting mountain forests, maintaining an ecological balance and relieving pollution. With electricity available, we can also more easily develop science and educational undertakings and carry out

cultural, recreational and other activities, accelerating the pace of building rural socialist spiritual civilization. In sum, there are many advantages in setting up rural small hydroelectric stations.

Experience in many areas shows that the establishment of a small hydroelectric station does not require the investment of much money by the state. It produces quick and great results. Therefore, where conditions permit, we should energetically set up small hydroelectric stations. In addition, many areas can draw on wind power, geothermal energy, tides, solar energy, and so forth to generate electricity, as local conditions permit. They can thus solve the problem of the acute energy shortage in many ways.

In developing small hydroelectric stations, we must turn to the masses and rely on the masses. We cannot rely on the state and turn to it for help. Small hydroelectric stations involve a small scale and simple technology. They can be established locally to provide electricity for local consumption. They can generally be set up by counteis, communes and brigades and even by individual peasant households. With the introduction of the rural responsibility system, peasants have more income and have money to spare. Especially in certain mountainous areas with waterpower resources, peasants want badly to set up small hydroelectric stations. The leadership at all levels must understand what they want, note their enthusiasm for establishing hydroelectric stations, take full advantage of the favorable situation and organize them to energetically launch projects for the common welfare like small hydroelectric stations. The problem of money must be chiefly solved by such means as an area raising its own money, peasants pooling their funds and investing service or labor, and so forth. The state only renders support in the form of loans or proper subsidy. The practice of relying on our own resources and running an enterprise by the people with help from the government has for many years been an effective means of developing small hydroelectric stations adopted by many areas. Our country has a vast area. There is a great imbalance in economic development and in resources or conditions as far as many areas are concerned. But there are rich resources for the development of small hydroelectric stations. Where conditions permit, the countryside can first carry out electrification, raise the standards for electric power consumption a bit and broaden the scope for power consumption. But this must be done by chiefly relying on the masses themselves. We cannot always rely on the state to do things.

The key to the proper operation of small hydroelectric stations lies in adhering to the guideline of "self-construction, self-management and self-use." The masses set up their own electric power projects to meet their own needs. In general, they must not seek a linkup with the larger power grids and must not make the sale of electricity their aim. To help meet each other's needs, those areas capable of linking up with the larger grid must be given support by the grid. Thus, small hydroelectric stations can preserve their own zones for the supply of electricity, and maintain ownership and the relationship of being subordinate projects, with no change in the right of management. Profits realized from electric power generation and supply must be retained for small hydroelectric stations. In the season when water is abundunt, we can reduce the charges for electricity or put floating prices into effect.

CSO: 4013/143

SOUTHERN SHAANXI SAID WELL SUITED TO DEVELOPMENT OF SMALL-SCALE HYDROPOWER

Xi'an SHAANXI RIBAO in Chinese 27 Dec 82 p 3

/Article by He Mingtang /0149 2494 1016/ of the Provincial Hydroelectric Power Bureau: "Southern Shaanxi Is Suited to the Development of Small-scale Hydroelectric Power"/

/Excerpts/ Southern Shaanxi is in the Chang Jiang River Valley. It is separated from the central Shaanxi plain by the Qinling Range in the north, and Dabashan in the south neighbors Sichuan. The Han Jiang flows between the two mountain ranges from west to east.

The climate is subtropical and humid and the annual average temperature is between 11 and 16 degrees. The annual amount of rainfall is generally about 800 millimeters, reaching 1,800 millimeters in some parts of the Dabashan area. Because the drop of the river is steep, very rich hydraulic resources are found here and the area is well-suited for developing small-scale hydroelectric power. According to incomplete general surveys, the reserve of hydraulic resources in southern Shaanxi is 7.25 million kilowatts, and exploitable resources amount to 4.65 million kw. The exploitable resources of small-scale hydroelectric power are 1.13 million kw. Of the province's total exploitable water resources, 63.4 percent are here, and of the province's exploitable hydroelectric resources, 72 percent are in this area.

It is necessary to actively develop small-scale hydropower in the mountain regions in southern Shaanxi. The characteristics of electricity use in the mountain regions are that the power lines are long, the points are scattered, the quantity is small and the area is broad. Within the near term, it is very difficult for the national power networks in most regions to reach this area. Construction of large hydroelectric power projects requires large investment and a long construction period, and it is very difficult for large power transmission and supply facilities to adapt to the characteristics of electric power consumption in the mountain regions. Small-scale hydroelectric power is small in scale, produces quick results, can be built locally according to need and can be used locally. It does not require large power transmission and supply facilities, is easy for the locality to construct and manage, and can adapt to the characteristics of electric power use in the mountain regions. At the same time, resources for forestry and handicraft production are rich in the mountain regions of southern Shaanxi. The problem

of power for processing such products urgently needs to be solved. Developing small-scale hydroelectric power in a major way is a most practical way to solve this problem.

An outstanding characteristic of electric power production is that generation, supply, and consumption occur simultaneously, and production, supply, and marketing are completed at once. In the present stage, the problem of storing electrical energy has not been solved. Batteries, storage batteries, and calcium carbide products can all convert electrical energy into chemical energy and store it. This storage method has a small capacity, a low efficiency, the waste of energy is large, and it is very limited when used as power for production. After small-scale hydroelectric power stations have been built, electrical energy that cannot be used up in production or stored can be supplied to the masses for cooking and heating.

Electricity can be substituted for firewood, and this protects the forest vegetation in the mountain regions and maintains the ecological balance.

9296
CSO: 4013/101

LIAONING'S SMALL-SCALE HYDROPOWER POTENTIAL LARGELY UNTAPPED

Shenyang LIAONING RIBAO in Chinese, 29 Dec 82 p 1

/Text/ The shortage of electricity in the countryside in our province is serious. If all places that have hydroelectric resources can develop small-scale hydroelectric power as Huanren County has done, then not only will the conflict in the shortage of electricity in the countryside be eased, the development of small-scale hydroelectric power will also favorably stimulate the development of agriculture, industry and sideline production and improve the living standard of the peasants.

Our province's hydroelectric resources are relatively abundant, and the development of small-scale hydroelectric power has a great future. According to general surveys: The whole province has small hydroelectric resources of about 400,000 kilowatts that can be exploited and utilized. If these resources are developed and utilized, the annual electricity output can reach 1.2 billion kilowatt-hours, equivalent to about one-half the amount of electricity used in rural areas throughout the province. But in view of the present development and utilization of small hydroelectric resources, we can only say that they are just beginning. The whole province now has 111 small-scale hydroelectric power stations with an installed capacity of 48,000 kilowatts, constituting only 12 percent of exploitable resources. They generate about 75 million kilowatt-hours of electricity a year, constituting only 2.7 percent of the amount of electricity used in the countryside. Therefore, we must take the development of small-scale hydroelectric power as a major solution to the energy problem in the countryside so that small-scale hydroelectric power can serve an even greater role in stimulating agricultural prosperity during the period of national economic recovery.

The main problems at present are the following: Policies are not implemented, there is less investment, and with a low management level, the economic benefits are poor. In developing small-scale hydroelectric power, we must implement the principle of letting the localities carry out the work with state subsidies and insist on letting the people manage the projects with public assistance. We must follow the principle of "whoever builds, owns, manages and benefits", we must conscientiously implement various concrete policies, fully mobilize the enthusiasm of the three administrative levels of the county, the communes and the brigades to develop small-scale hydroelectric power. We not only can promote joint efforts among the county, communes and brigades, at places

where conditions are favorable, we can also advocate joint efforts with peasants to develop small-scale hydroelectric power. To hasten the development of small-scale hydroelectric power, the state will appropriately increase investment to provide assistance in the future. The county, communes and brigades should also develop the spirit of self-reliance and expand the sources of private funds.

9296
CSO: 4013/97

HUANREN COUNTY BUILDS 10 SMALL HYDROPOWER STATIONS

Shenyang LIAONING RIBAO in Chinese, 29 Dec 82 p 1

/Article by Liu Jingquan /0491 6975 3123/: Huanren Builds 10 Small Hydroelectric Power Stations; Rural Power Is 90 Percent Self-Sufficient"/

/Text/ Huanren County has implemented the principle of "whoever builds, owns, manages and benefits", and county, commune and brigade levels have worked to build electric power. They completed 10 small-scale hydroelectric power stations with a total installed capacity of 5,290 kilowatts and an annual output of 11.3 million kilowatt-hours of electricity. This has solved 90.7 percent of the shortage of rural electric power.

Huanren County is the origin of our province's small hydroelectric power, but in the course of developing electric power, there have been some ups and downs, and the development has never been fast. Up to 1978, it only had three power stations with a total installed capacity of less than 100 kilowatts. After the Third Plenum of the Party, they drew up a new plan to develop small-scale hydroelectric power to solve the difficulty in supplying electricity to the mountain regions, trained technical personnel for small-scale hydroelectric power, and solved technical difficulties in developing small-scale hydroelectric power. In the buildup of small-scale hydroelectric power, they implemented the principle of "whoever builds, owns, manages and benefits", changed the mistaken method of egalitarianism and indiscriminate transfer of resources of the past, and mobilized the enthusiasm of cadres at each level and of the masses. The county, communes and brigades began building power stations together. The county built large ones, the communes built medium-scale ones and the brigades built small ones. The Dongfanghong Power Station built by the county utilized the fall of the Hun Jiang at Dongjiachuanying. A large dam was built across the river and 11 generators with total installed capacity of 1,750 kilowatts were installed. Yahe Commune built three 500-kilowatt power stations along the Ya He River Valley which is less than 5 kilometers long. The Laomanzi Brigade, Pulebao Commune, built a 100-kilowatt power station by itself.

The development of small-scale hydroelectric power has provided electricity to every trench, every branch waterway, every commune and every brigade in Huanren County. Besides lighting, the masses have continued to open up ways to use electricity for living and for production. Rural food grains and oil

processing, threshing and feed crushing have all realized electrification, and a large number of laborers has been liberated. The masses call the small hydroelectric power stations "fortune stations". In recent years, the communes and brigades have also used electricity to establish timber processing plants, canneries, small farm tool factories and brick and tile factories. Besides solving their own needs, most of these small hydroelectric power stations have joined the national power networks. A 500-kilowatt power station can realize a net profit of over 40,000 yuan a year.

Huanren County plans to build a total of 40,000 kilowatts of hydroelectric power. At present, efforts are concentrated in the development of the hydraulic resources of the Ya He according to a cascade plan and construction is continuing.

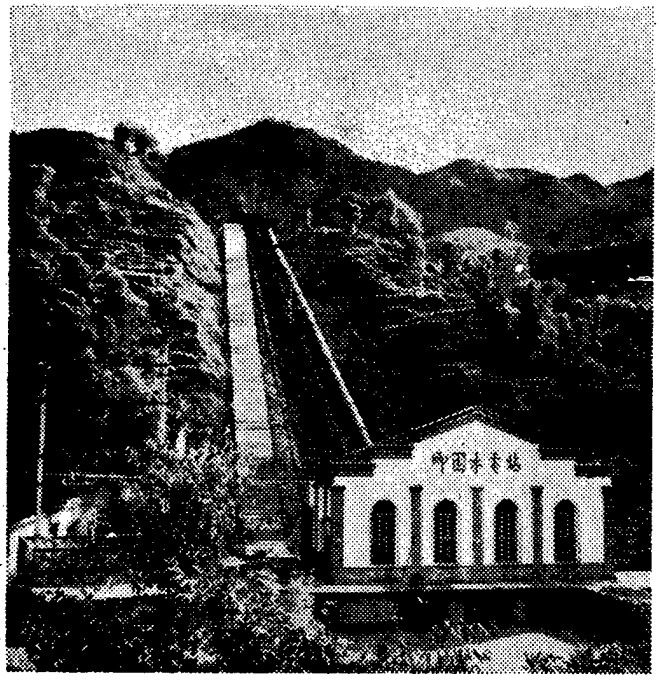
9296
CSO: 4013/97

FUJIAN BUILDS 9,000 SMALL-SCALE HYDROPOWER STATIONS

Beijing RENMIN RIBAO in Chinese 19 Feb 83 p 2

[Excerpts] Fujian Province, rich in hydropower resources, is relying on the masses and local funding to develop small-scale hydropower. As of the end of 1982, more than 9,000 small-scale hydropower stations with an installed capacity of 725,000 kilowatts producing 1.5 billion kilowatt-hours of electricity had been built. Eighty percent of the cities and counties in the province rely heavily on the power from these small-scale stations. Today, all of the communes, 82 percent of the brigades, and 70 percent of the production units have electricity.

Below the county level, small-scale hydropower plays an important role in meeting the electricity demands for production and daily living in industrial and agricultural enterprises. Electric pumping that "uses lines to replace ditches" reduces expenditures for constructing ditches and cuts down on the volume of water lost. In the 40,000 commune enterprises in the province, 70 percent of the output value relies on small-scale hydropower production.



The Qingyuan 795-kilowatt power station, Yongchun County, Fujian Province

CSO: 4013/139

HYDROPOWER

SHANGBIAO IS NATION'S FIRST DOMESTIC JOINT CAPITAL DEVELOPMENT PROJECT

Hangzhou ZHEJIANG RIBAO in Chinese 9 Jan 83 p 1

[Text] The Shangbiao Hydroelectric Power Station in Yunhe County, a joint capital development project undertaken by Zhejiang Province and the Ministry of Water Conservancy and Electric Power, has been approved by the State Planning Commission. Work is to begin immediately. This is the first joint capital development project involving a hydroelectric power station to be undertaken by central and local authorities in China. The survey and design work on the hydropower station has now been largely finished. Preparatory work concentrating on electrification, water supply and roadways and site grading is to begin shortly.

The Shangbiao Hydroelectric Power Station is located on the border between Zhejiang and Fujian provinces, in a major forest region near Dongkeng in Yunhe County. The mainstream in the Shangbiao river valley is 45 kilometers long with a catchment area of 363 square kilometers. Here, the Chengtiankeng, Yubiao Xi, Daji Xi, and Chundai Xi converge and flow into the system formed by the Ou Jiang and Xiao Xi. The preliminary phase is divided into four stages, with approval now made on the first stage, the Shangbiao Hydroelectric Power Station, with an installed capacity of 16,000 kilowatts capable of generating 48,000,000 kilowatt-hours of electricity a year. Total investment is more than 23 million yuan, with a 3-year construction period planned for the major part of the work.

CSO: 4013/153

BRIEFS

PANJIAKOU RESERVOIR NEARS COMPLETION--Shijiazhuang, January 20 (XINHUA)--Principal construction of the Panjiakou Reservoir--the largest hydraulic engineering project in north China--is nearing completion, the Hebei Provincial Department of Water Resources and Electric Power said. Work began in 1975 on the reservoir which is designed to divert water from the Luanhe River to Tianjin and Tangshan, water-poor industrial cities in north China. The hydro-engineering project includes a dam 1,040 meters long and 107.5 meters high and a power station with a generating capacity of 450,000 kilowatts. The dam, which involved the pouring of 2.8 million cubic meters of concrete, is China's third largest, next only to the Gezhouba Hydroelectric Power Station and the Danjiangkou Reservoir, in Hubei Province. Upon completion, the reservoir is expected to cover a water surface area of 67 square kilometers and store more than 2.9 billion cubic meters of water, able to supply some 2 billion cubic meters of water annually to Tianjin and Tangshan, the department said. The reservoir began to store water in 1978 and expects to supply water by the end of 1983. The power station is designed to generate 638 million kilowatt-hours of electricity annually. The first generator with a capacity of 150,000 kilowatts went on stream in 1979. [Text] [OW291445 Beijing XINHUA in English 0711 GMT 20 Jan 83 OW]

QINGHAI POWER STATION--Xining, January 23 (XINHUA)--Construction of a 250-kilometer, 330,000-volt transmission line will begin soon to link two substations with the largest hydroelectric power station on the upper Huang He, the Qinghai Provincial Power Industry Department said. The Longyangxia hydroelectric project in Qinghai Province, northwest China, is designed to have a generating capacity of 1.28 million kilowatts, the department said. When completed in 1987, it will be able to supply 6 billion kilowatt-hours of electricity annually to Qinghai, Gansu and Shaanxi provinces. The first generating unit is scheduled to go into operation in 1985. Principal construction of a substation with a capacity of 300,000-kilovolt-amperes is nearing completion in Qinghai, and preparations are underway for construction of another substation in neighboring Gansu Province--with a capacity of 480,000-kilovolt-amperes. The Longyangxia Power Station will have six 330,000-volt transmission lines to Taling more than 2,000 kilometers in length, the department said. The first line will cross mountains averaging more than 2,500 meters above sea level. [Text] [OW291409 Beijing XINHUA in English 0718 GMT 23 Jan 83 OW]

CSO: 4010/43

GUANGDONG SMALL-SCALE HYDROPOWER--Guangdong has built more than 12,000 small-scale hydropower stations representing 20 percent of the province's generating capacity. Since the Third Plenary Session, Guangdong's rural small-scale hydropower rate of growth has been speeded up. From 1980 to 1982, more than 120,000 kilowatts in installed capacity were added. According to preliminary figures, there are now more than 12,000 small-scale hydropower stations in the province with an installed capacity of 1,240,000 kilowatts, or 20 percent of the total installed capacity in the entire province, exceeding the rural demand. Among the 101 counties and cities in the province that have hydropower resources, 99 have developed them, bringing electricity to more than 98 percent of the communes, 81 percent of the brigades, and 60 percent of the production units throughout the province. Liannan, Meixian, Longmen, Huaiji, Jiexi, and other counties supply electricity to more than 80 percent of their rural households. [Text] [Beijing GUANGMING RIBAO in Chinese 12 Feb 83 p 2]

CSO: 4013/139

TAIZHOU POWER PLANT'S NO 1 GENERATOR NOW OPERATIONAL

Hangzhou ZHEJIANG RIBAO in Chinese, 19 Dec 82 p 1

[Article by Yin Zuoyou [3009 0155 0645] and Chen Xingde [7115 1630 1795]: "Taizhou Power Plant's No 1 Generator Joins the Network and Generates Electricity; Annual Output Is 800 Million Kilowatt-hours of Electricity; It Will Serve Importantly To Ease the Serious Shortage of Electricity in Central, Southern Zhejiang"]

[Text] On 17 December a key harbor power station--the Taizhou Power Plant, built with joint investment by the state and Zhejiang Province, has announced good news: The first 125,000-kilowatt generator of the first phase of construction has joined the network and has begun to generate electricity, ahead of the original plan by more than 2 months.

The strong current of electricity surged through the new 220,000-volt high voltage power transmission line to join the East China Power Grid, feeding electricity to Ninghai and Ningbo in the north, and Linghai and Jinhua in the west. It will pass through the 220,000-volt Taizhou-Linghai-Wenzhou power transmission and transformer project that is being intensively built to send electricity to Wenzhou in the south. This will have a major impact on easing the serious shortage of electricity in the central and southern parts of Zhejiang, and promote the development of industrial and agricultural production throughout the province.

The Taizhou Power Plant is located in Qiansuocun near Taizhou Wan. Work began on 25 March 1979 and overall construction began in June 1981. Since then, over 20 units including the Provincial Design Institute, the Provincial Thermoelectricity Construction Company, the Second Engineering Company of the Provincial Building Construction Bureau, the Provincial Harbor Construction Team, the Provincial Electric Power Testing Institute, a certain unit of the East China Sea Fleet and the construction companies of Taizhou, Linghai, Jiaojiang, Wenling and several thousand civilian workers overcame difficulties and worked together. They broadly used new techniques, new materials, and new technology, taking only 19 months to complete the construction task for the first phase of construction, and created a new record in superior quality and highly efficient construction of a thermal power station in our province.

The design capacity of the Taizhou Power Plant is 500,000 kilowatts, to be installed in two stages. A total of four 125,000-kilowatt dual internal water cooled steam turbine generators will be installed. The No 1 generator that began production on the 17th can generate 800 million kilowatt-hours of electricity each year. Work on installing the second generator is being accelerated and it is expected to begin production in August of next year.

9296
CSO; 4013/107

BRIEFS

XIAOLONGTAN 600,000-KILOWATT POWER PLANT--Yunnan's biggest thermal power plant to date will have a total installed capacity of 600,000 kilowatts. It will be built in three stages with a completion date of 1990. On 20 January, a ground-breaking ceremony was held to mark the start of construction on the first-stage main project of the Xiaolongtan Power Plant at Kaiyuan. This power plant is the first pit-mouth power plant in Yunnan. Four generators will be installed, with a total installed capacity of 600,000 kilowatts, making it the largest thermal power plant in the province. In the first-stage main project of the plant, two 100,000-kilowatt generators will be installed, with one generator slated for installation in 1985. The scheduled completion date for the 2nd and 3rd stages of the project is 1990. The Xinan Electric Power Design Institute, the Provincial Railway Construction Company, the Provincial Survey and Design Institute, the Provincial Thermoelectric Construction Company, and the Provincial Construction and Engineering Department responsible for the design, preparation, and construction are now preparing for the start of the main stage of construction. [Excerpts] [Kunming YUNNAN RIBAO in Chinese 28 Jan 83 p 1]

CSO: 4013/153

COAL MINISTER LAYS OUT INDUSTRY'S STRATEGIC TARGETS

HK180217 Beijing JINGJI RIBAO in Chinese 1 Jan 83 p 2

["Interview With Leading Economists" column by reporters Lian Yimin [6647 0001 3046] and Ding Shi [0002 1102]: "Ensure Quadrupling by Doubling--Coal Minister Gao Yangwen Speaks on Strategic Target for the Coal Industry"]

[Text] Will the coal production in the next 18 years satisfy the needs of industrial and agricultural developments? In order to answer this question, we interviewed Gao Yangwen, minister of coal industry.

Comrade Gao Yangwen told us that since the grand strategic target was put forth by the 12th CPC National Congress, the question of whether coal production, which is the main source of energy in our country, can be promoted has become a matter of great concern to the people throughout the country. We cadres and workers on the coal front can feel the great pressure on our shoulders. We have held many meetings to discuss this matter and have made up our minds to go all out to create a new situation in coal production so that coal output in our country can be doubled, that is, can be increased from more than 0.6 billion tons to 1.2 billion tons, by the end of this century, on the basis of raising economic returns and economizing on energy resources, and that the target of quadrupling the total industrial and agricultural output value can be guaranteed. This is the strategic target for the coal industry in the new historical period. We have confidence in the fulfillment of this target.

Is this a "high target" and a "rash advance?" As some people are worrying about this matter, we asked Comrade Gao Yangwen to offer his opinions. He first showed us the following two data: 1) The average annual growth rate. The average annual growth rate of the increase from 0.6 to 1.2 billion tons in 20 years is 3.4 percent. However, from 1950 to 1980, the average annual growth rate of coal production in the whole country was 10 percent, during which the "First Five-Year Plan" period saw an increase of 14.5 percent, and there was also an increase of 5.2 percent in the "Fifth Five-Year Plan" period, which was lower than other periods. All these growth rates are higher than the present one. 2) The quantity of increase. In order to double coal output in 20 years, there must be an average annual increase of 30 million tons. During the "Third" and "Fourth Five-Year Plan" periods, the average annual increase was about 25 million tons. In the "Fifth Five-Year Plan" period,

it reached more than 27 million tons. Since the production capacity has been increased and more new pits, which are larger in scope, have been put into production, it is possible that a greater increase will be made in the future.

He then briefly analyzed the advantageous conditions for doubling coal output. 1) The CPC Central Committee and the State Council have attached great importance to the coal industry, taking it as a strategic focal point. They have supported its development with funds, material and human resources. 2) There are rich coal resources in our country. As has been surveyed so far, there is a deposit of more than 640 billion tons of coal in our country. 3) Over the past 30-odd years, a production capacity of producing 0.6 billion tons of coal has been established and a contingent of more than 4 million staff and workers have been built up. 4) Some mines have gained experiences in mechanized mining. Last year, five comprehensive coal extraction plants topped 1 million tons in their annual production, and were among the advanced in the world. Since the capacity of producing coal mine machinery has been increased, we shall be able to reform the old pits with large quantity of advanced equipment. These are grounds and forceful guarantees for doubling coal production.

"Of course," Comrade Gao Yangwen said, "it is an arduous task for us to realize this target. There are many difficulties." After citing five weak-points in coal production, he said that it will be difficult to increase the production capacity by 0.6 billion tons in 18 years, which was achieved in 30 years in the past, if we do not make great efforts and blaze new trails.

In order to blaze trails for a quicker development in coal production, the main leading comrades in the Ministry of Coal Industry have gone deep into the pits and worksites many times to investigate, study and conscientiously sum up both positive and negative experiences. They have repeatedly consulted coal experts and have worked out an initial plan for blazing a new trail. Recently the Ministry of Coal Industry held a national conference on coal production work to collect opinions of leading comrades and technicians from various local coal enterprises, to pool collective wisdom and unify thinking, and to discuss the question of blazing a new trail and creating a new situation. At the conference, the following four strategic stresses for the work in the future was decided: Firmly grasp technological reform of the existing pits; in building new pits, concentrate efforts on opencast mining and construction of medium- and small-sized pits, while large pits are [word indistinct] and put into production by stages; forcefully develop local mines; and develop education and science.

After giving a brief introduction of the national work conference, Comrade Gao Yangwen said cheerfully that since our comrades have studied the documents of the 12th CPC National Congress, they have broadened their vision and have a very good mental attitude. They hold identical views and are energetic. They all hold that when correct policies are implemented to mobilize the initiative of various fields in the building of mine and coal production and developed on a foundation of advanced science and technology, the coal industry is full of hopes and it is perfectly possible to achieve the target of ensuring quadrupling by doubling.

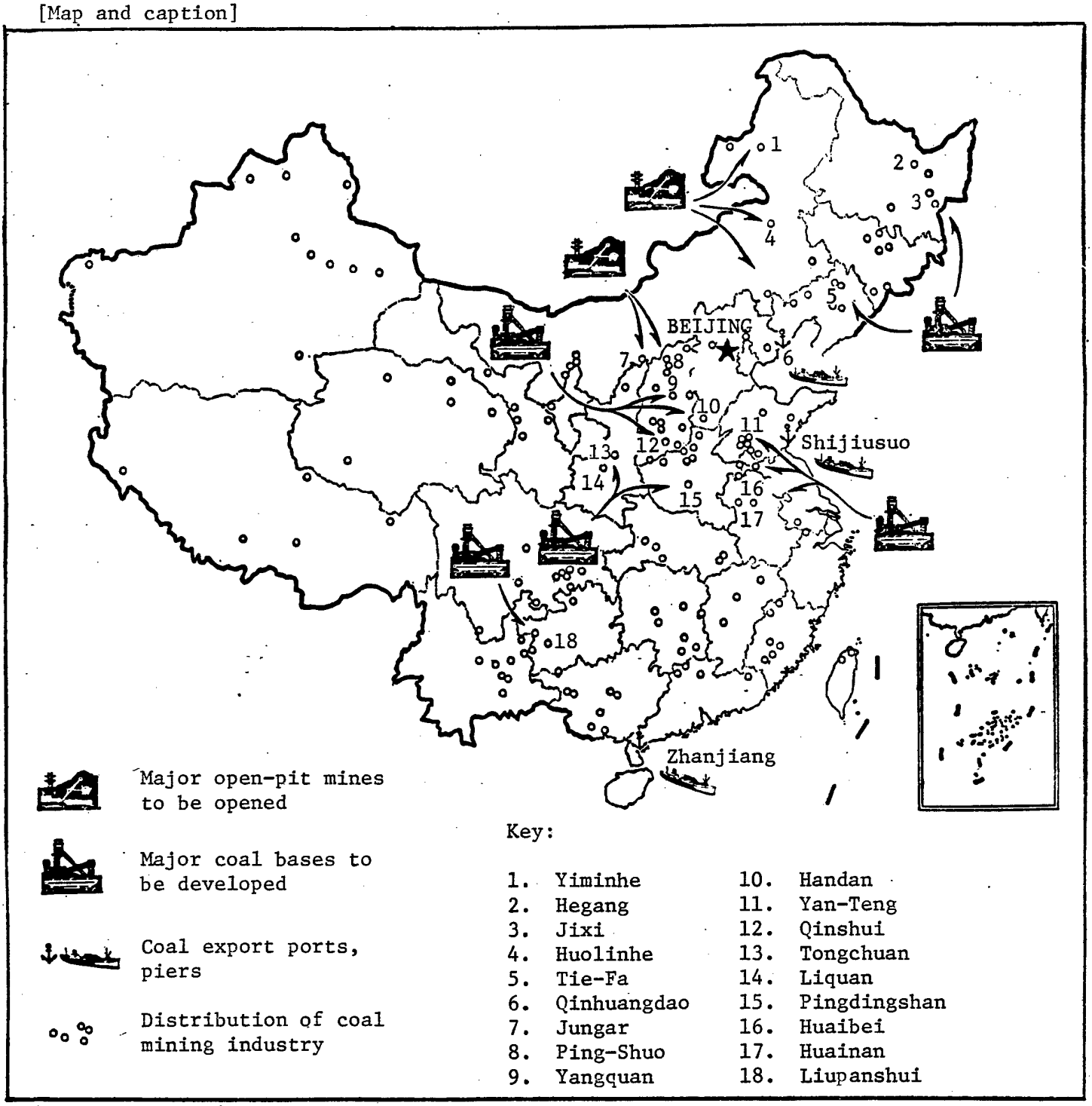
CSO: 4013/133

COAL

MAP DEPICTS AMBITIOUS PLANS TO DEVELOP NATION'S COAL INDUSTRY

Shanghai SHIJIE JINGJI DAOBAO in Chinese 7 Feb 82 p 4

[Map and caption]



In the Sixth 5-year Plan period, China's coal industry will build and develop coal fields in Shanxi, the Northeast, and eastern Nei Monggol. Concurrently, fields in western Henan, Shandong, Anhui, Jiangsu, and Guizhou will be opened up. In order to accelerate the growth of the coal industry, forces will be concentrated to develop open-pit mines, the technology of existing mines will be upgraded, and small- and medium-sized mines will be built.

CSO: 4013/142

KEY AREAS IN DEVELOPMENT OF COAL INDUSTRY DESCRIBED

Beijing GONGREN RIBAO in Chinese 25 Oct 82 p 3

[Article: "Prospects for Development of China's Coal Industry"]

[Text] In order to quadruple the annual output of industry and agriculture, coal output must be greatly increased. This requires that we make full use of our country's advantage of rich coal resources and focus, during the next 18 years, on constructing the five major open-pit coal mines and continuing construction of the 10 major coal bases, while also building some key underground mines.

The Five Major Open-Pit Coal Mines

The Huolin River Open-pit Mine. Located in Zhelimumeng, Nei Monggol, this area has rich brown coal reserves. Construction is now proceeding vigorously in an effort to expand production to 20 million tons a year by about 1995.

The Yimin River Open-pit Mine. Located in Hulun Buir grassland, this area has an explored reserve of 5.05 billion tons. Work on the No 1 open-pit mine will begin in 1983, and several other open-pit mines will be built thereafter in an effort to bring production to 20 million tons a year by 1995. The area will be built up into a large-scale coal mining and electric power combine.

The Yuanbaoshan Open-pit Mine. Located in the Pingzhuang mining district, Nei Monggol, this open-pit mine will have a design capacity of 8 million tons a year. Work on it will begin soon; preparations are being made to use the new continuous extraction technology.

The Pingshuo Open-pit Mine. Located in Pinglu and Shuo counties, Shanxi, this open-pit mine has explored reserves of 5.07 billion tons, all low-quality motive power production coal. Its design capacity is 15 million tons of Antaibao coal a year. Preparations are being made for construction, and foreign investment participation is welcomed. Also located here is the Anjialing field, where work will begin somewhat later.

The Zhunge'er Open-pit Mine. Located in western Nei Monggol, this area has well-explored reserves of 3 billion tons suitable for open-pit mining; the district's mid-term extraction scale may be as high as 30 million tons a year.

The 10 Major Coal Bases

The Hanxing Base. Located in Hebei Province, and including the Fengfeng, Handan and Xingtai mining districts, the area has an existing production capacity of 14 million tons a year. Four mines are under construction, and others are to be built.

The Jinzhong Base. This is located in central Shanxi Province and includes the Xishan, Gujiao, Huo County and Fenxi mining districts. Its existing production capacity is 15 million tons a year. One new mine is under construction and construction of some large mines is planned. This is our country's largest high-quality coking coal base.

The Jindongnan [southeast Shanxi] Base. Located in southeast Shanxi Province, this includes the Yangquan, Lu'an, and Jincheng mining districts. Its current production capacity is 18 million tons a year, with several large mines planned. It will become our country's largest anthracite base.

The Shenyang Perimeter Base. This includes the Tiefa (Kangping), Shenbei and Hongyang mining districts. Its present production capacity is 5.8 million tons a year. Three new mines are under construction and more are planned for the future. An effort is being made to increase capacity to 18 million tons a year.

The Eastern Heilongjiang Base. This base includes the Jixi, Hegang, Shuangya and Qitaihe mining districts and has a current capacity of 30 million tons a year. By exploiting unused potential in existing mines and building new ones an effort is being made to increase capacity to 45 to 50 million tons a year.

The Lianghuai Base. This base consists of the Huainan and Huaibei mining districts in Anhui Province, with a current capacity of 17.8 million tons a year. Both of these mining districts have extensive development prospects. By the end of the century they may reach a capacity of 50 to 60 million tons a year.

The Yanteng Base. This base includes the Yanzhou, Jining, and Teng County mining districts in Shandong Province, with a current production capacity of 6.35 million tons a year. Four mines are under construction and preparations are being made to build other large mines.

The Yuxi Base. This base is located in western Henan Province and includes the Xinmi (Dengfeng), Pingdingshan (Yu County, Linru), Yima and Xinggong mining districts. Its current capacity is 28 million tons a year. Three mines are under construction and 20 new mines are planned.

The Weibei Base. Located in Shaanxi Province, this includes the Tongchuan (Huangling), Pubai, Chenghe and Hancheng mining districts and has a current capacity of 16.81 million tons a year. An effort is being made to increase capacity to 30 million tons a year by the end of the century.

The Liupanshui Base. This base is located in Guizhou Province and includes the Liuzhi, Pan County and Shuicheng mining districts there and the Enhong and Fengyuan mining districts in eastern Yunnan. Its current production capacity is nearly 10 million tons a year. Two projects are under construction, and other mines are to be built in the future to bring the capacity to 25 to 30 million tons a year.

8480
CSO: 4013/51

HUAIBEI COAL FIELDS COULD BECOME ANOTHER RUHR VALLEY

HK220852 Hong Kong MING PAO in Chinese 22 Feb 83 p 5

[Article by special correspondent Zong Juan [1350 3197]: "Huaibei to Imitate the Ruhr; Preparations for Building It Into a Coal and Iron Base"]

[Text] Beijing, 21 Feb--Yang Jike, the first professor appointed as vice governor, recently revealed to this correspondent at the office of the Anhui provincial government that starting with the great Huaibe coal field as a base, he planned to develop it into a "Ruhr"-type coal and iron industrial base near the Chang Jiang River delta economic base.

Yang Jike said that the area, where Emperor Zhu built his family fortune, had traditionally been known for its poverty. In the past 30 years, and especially in the past 4 years, great changes have taken place there. Now, this isosceles triangle, each side measuring 150 kilometers, with a total area of about 10,000 square kilometers, stretching from Bengbu in the east to Fuyang in the west and to Huaibei City in the north to Huainan City in the south, has become a treasure house, with coal and charcoal production as its economic mainstay. The coal and charcoal here and the iron ore resources in Huainan and Jiangnan can be exploited for several centuries. The Yang Silica mine and the Fengtai phosphorus mine within this area are very rich in deposits. As for shipping, this area, is on the lower reaches of the Huai He and can be linked up via Hongze Hu, Wabu Hu and Chao Hu with the Chang Jiang. Iron ore abounds in this province. Moreover, Ma'anshan on the southern bank of the Chang Jiang has complete sets of iron and steel smelting equipment and the required skills. In building an iron and steel industry, the area does not need to depend as much on iron ore from other provinces or from abroad, as the Ruhr valley region does. It may be said that this area combines the strong points of both the Ruhr valley of West Germany as a coal area and Lorrain in France as an iron area. It is well endowed by nature and has a bright future.

The Beijing authorities are now concentrating forces on preparing to build an economic area in the Chang Jiang delta, with Shanghai as its center, and a coal and charcoal base, with Shanxi Province as its center. This represents two major breakthroughs in economic development and system reform during the Sixth 5-Year Plan. Here lies the key to modernization. Yang Jike made a comparison between Huaibei and Shanxi. Shanxi Province abounds in coal and charcoal, but it is surrounded by mountains. It is not economical to rely on railroad transportation. Slurry pipelines are also limited by geographical

factors. On the other hand, the fan-shaped area of Anhui Province on the southern plains of the Huang He and the Huai He River is crisscrossed by streams and waterways. It requires a smaller investment than Shanxi, in regard to the building of canals, railroads or coal slurry pipelines. The building of projects is also easier. He pointed out that once the Jiang Huai Canal linking Wabu Hu and Chao Hu is opened to shipping, this coal area will not need to rely completely on the Tianjin-Shanghai railroad. It is more conveniently linked up with the Chang Jiang River delta economic area through the water route. As far as the economic and material infrastructure is concerned, this area already has medium-sized cities such as Huaibei, Huainan, Bengbu, Fuyang, and Suxian, and also small-sized cities like Mengcheng, Woyang, Guzhen, Huaiyuan, and Suiqi. Agriculture, sideline occupations, animal husbandry and fishery within this area have in recent years showed relatively quick and satisfactory growth. It can be said that it is provided with favorable natural, geographical and human factors. The medium- and small-sized cities dotting the area will in the future be provided with newly developed industries like coal, electric power, iron and steel, chemicals, machine building, and construction materials. These cities will be like the Ruhr Valley industrial area in West Germany. These projections are by no means empty talk; they can be realized.

CSO: 4013/146

NEW GANSU SHAFTS TO PRODUCE 600,000 TONS OF COAL A YEAR

Lanzhou GANSU RIBAO in Chinese, 2 Jan 83 p 1

[Article by Yan Jingyu [7051 2529 7183]: "Two Pairs of New Shafts at Wangjiashan Coal Mine in Jingyuan Have Been Completed; Gansu Adds New Capacity To Produce 600,000 Tons of Raw Coal"]

[Excerpt] Two new pairs shafts--the Wangjiashan Coal Mine Shafts No 3 and No 4, each capable of producing 300,000 tons of raw coal a year and both designed, constructed and equipped by our province, have been completed. After the state inspected them, a celebration of their completion and delivery was held at the Wangjiashan Coal Mine on the eve of the new year. The special railroad line serving the Wangjiashan Coal Mine is 44.78 kilometers long. After 5 years of construction, it has also been completed and it will soon become operational. During the inspection and delivery period of these two projects, the Ministry of Coal Industry sent congratulatory telegrams.

The No 3 and No 4 shafts at Wangjiashan Coal Mine are two pairs of oblique skip shafts at the center of the Wangjiashan Coal Fields in the Jingyuan Mining Area. The new shafts are near the Huang He in the south. The source of water is abundant, transportation is convenient, and the power supply is reliable. The total underground reserve of the coal field is 400 million tons. Mainly, two seams with an average thickness of 30 meters can be exploited. The contents of phosphorus, sulfur and ash are all low. The coal is a good coal for power. The completion of the new shafts will increase the coal supply in our province, promote economic development and realize "one doubling to guarantee quadrupling." These two pairs of new shafts were designed by the Lanzhou Coal Mining Design Institute and jointly constructed by the Second and Third Engineering Departments of the Provincial Coal Capital Construction Company. The level of mechanized equipment in lifting, ventilation, drainage, air pressurization and ground coaling and storage, coal screening, heat supply and such industrial and production systems is all good. The above-ground concentrated production system for 1,800,000 tons is our province's largest and most advanced coal mining above ground industrial facility at present. Two active faces have already been prepared underground. Because the coal seams are thick and their inclination large, mining is done by oblique cutting with wire mesh false ceilings. Underground coaling of raw coal uses a chained plate transporter and conveyor belt transporters. Lifting is done by double rope skips. After 4 years of construction, the projects of the two pairs of shafts involved tunneling

19,000 meters underground, civil engineering construction of 59,600 square meters, and installation of more than 1,100 units of equipment, forming a preliminary comprehensive productive capability of an annual output of 600,000 tons of raw coal for the two pairs of shafts.

More than 5,000 workers worked on the project.

9296
CSO: 4013/107

UPGRADING OF HEBEI COAL MINES BOOSTS OUTPUT

OW031208 Beijing XINHUA in English 1139 GMT 3 Jan 83

[Text] Shijiazhuang, 3 Jan (XINHUA)--Technical upgrading has increased the output of major coal mines in Hebei Province to 39 million tons in 1982--six million tons more than 1976--according to the provincial coal industrial department.

Hebei Province ranks second in China in coal output--51.8 million tons in 1981--second only to neighboring Shanxi Province, and first in the country in washed coal output--11.67 million tons in 1981.

Since 1976 the mines have completed 43 technical revamping projects, along with installation of water and power facilities, the department said.

As a result, 15 of the 18 mines which were previously unable to meet their annual production quotas have met or topped the respective design capacities. For example, the No 5 mine in the Fengfeng coal mining area now produces 1.2 million tons a year, double its previous capacity.

Technical upgrading involves the use of advanced technology such as hydraulic coal mining and new equipment, including electric locomotives, air compressors and winches.

The Xingtai mine reports mechanization of 99 percent of the coal cutting processes, among the highest percentages in China, as a result of the use of coal combines and other equipment.

Technical upgrading has also promoted operational safety, the department said. Sixteen mines with a high content of methane and gas have sunk more air shafts or replaced ventilation facilities.

CSO: 4010/41

BIG NEI MONGGOL COAL MINE TO START UP IN 1984

OW021741 Beijing XINHUA in English 0831 GMT 2 Feb 83

[Text] Hohhot, 2 Feb (XINHUA)--A large, modern open-cast coal mine in north China's Nei Monggol is expected to go into production in 1984 as a result of intensified construction, according to local mining authorities.

Located in eastern Nei Monggol, the Houlinhe open-cast coal mine has 12.9 billion tons of known lignite coal reserves. It is expected to turn out 1.2 million tons next year and 3 million tons in 1985.

To date, a total of 15 million cubic meters of earth and stone has been removed from the mine's cutting area. A 400-kilometer railway line and paved highways have been opened to traffic.

Three thermal power plants in the mine area are now under accelerated construction and catering facilities and services have been established.

Work is underway to construct three other major open-cast coal mines in Nei Monggol which have an aggregate known coal reserve of more than 25 billion tons, mostly "long flame" coal. These are the Yiminhe, Yuanbaoshan and Junggar mines.

A large coal field with 5.56 billion tons of known lignite coal reserve has been discovered in north Nei Monggol according to materials recently released by the local geological department. It has five coal seams averaging 18 meters thick.

A total of 192 coalfields have now been located in Nei Monggol. Among these, five have known coal reserves of more than 10 billion tons each. These are the Jungar, Dongsheng, Shengli, Baiyanhua and Houlinhe fields. Seven have coal reserves of 1 to 10 billion tons each.

Nei Monggol, producing some 20 million tons of coal a year, has a total known coal reserve of 194 billion tons--next to Shanxi, China's most productive.

CSO: 4010/41

SICHUAN OPENS NEW 900,000-TON-A-YEAR COAL MINE

Chengdu SICHUAN RIBAO in Chinese 6 Jan 83 p 1

/Article by reporter Li Xianfu /2621 7359 4395/: "One of the Key Projects in Energy Buildup in Our Province, the Shihao Coal Mine Is Completed and Begins Production"/

/Text/ The Shihao Coal Mine, a large coal mine producing 900,000 tons of anthracite a year and situated in the mountains inside Qijiang County was officially completed on 28 December 1982, and has begun production. The reserves of this mine are rich, the quality of coal is good, the degree of mechanization is high, traffic and transportation are convenient, and it is one of the key projects to build up energy in our province. Its completion and start of production will serve importantly to ease the energy shortage situation in Sichuan.

All of the underground construction and some of the ground surface construction of this mine were carried out by the Ninth Engineering Department of the Sichuan Coal Mine Capital Construction Company. Men from some of the construction zones of the Eighth, Eleventh and Twelfth engineering departments also went to the construction site to carry out work in separate areas. They cooperated and worked together, and under the massive support of the provincial and municipal governments and concerned departments, they guaranteed that construction of the mine was quick, the quality was superior and that it could rapidly begin production.

The topography, geomorphology and hydrology of the region of the mine were all very complex. The content of gas was large, the construction task was heavy, and the schedule was tight. The broad number of workers of the Ninth Department of the Sichuan Coal Mine Capital Construction Company carrying out major construction enthusiastically launched team competitions in quality grade achievement and in meeting the "guidelines." This improved the level of unit production and unit progress over large areas, and successfully created the experience of fast construction and superior quality construction. All subordinate teams achieved the standards of quality teams and "guideline" teams established by the Ministry of Coal Industry consecutively for 3 years. The department was named the "10,000-meter-level department," the "champion construction department in vertical shafts," the "champion construction department in oblique tunnel construction," the "champion

construction department in the construction of level tunnels through rock" by the Ministry of Coal Industry, and the State Economic Comission bestowed upon it the name "advanced construction enterprise of the whole nation."

During the construction of this mine, there were four major problems involving the surface production system: the vertical shaft elevation system, removal of civilian buildings, the withdrawal of construction teams, and the entry of production personnel. If they were not arranged well, they would have seriously affected early production by the mine ahead of schedule. The provincial coal administration tightly grasped implementation of work and satisfactorily solved every problem. The Eighth Department of the Sichuan Coal Mine Capital Construction Company was in charge of installing the winches of the vertical shaft system. The technical requirements were high. Although they lacked experience, but after careful organization and conscientious construction, they finally successfully installed it at the first try. The Twelfth Department of the Sichuan Coal Mine Capital Construction Company was in charge of building the auxiliary and main shafts, on-site industrial buildings and production, living and facilities such as bathrooms and mess halls. Although the projects were many and scattered and the schedule was tight, they concentrated strength, carried out the key projects, and guaranteed the needs to begin production. Workers of construction units started out from the overall situation, set up temporary work sheds in ravines, disregarded the bitter cold of winter, and rapidly vacated living quarters to let production units enter the site early. Now, the first group of workers entering the main shafts of the Shihao Coal Mine has taken up positions and has confidently begun the work to mine coal.

9296
CSO: 4013/101

SICHUAN MINES, RAILROADS WORK TOGETHER TO IMPROVE SERVICE

Chengdu SICHUAN RIBAO in Chinese 3 Jan 83 p 1

/Article by correspondent Lan Ligang /5663 4539 0474/ and reporter Shi Huagao /4258 0553 7559/: "Strengthening Coordination Between Mines and Railroads, Yongchuan Railroad Engineering Section and Yongrong Mining Bureau Cooperate to Satisfactorily Complete the 1982 Coal Transport and Production Plan"/

/Text/ The Yongchuan Railroad Engineering Section of the Chongqing Branch Railroad Bureau, and the Yongrong Mining Bureau strengthened coordination between railway transportation and mining, transported coal well, and respectively completed the 1982 coal transport and production plan satisfactorily.

The Shuangshi, Guangshunchang and Shiyanqiao railway stations subordinate to the Yongchuan Railway Engineering Section were responsible for the task of transporting coal produced by the various mines of the Yongrong Mining Bureau. Throughout the year, the amount of coal transported reached over 1.1 million tons. A total of over 3,000 tons on more than 60 cars was loaded a day on the average. The task was difficult. In recent years, the railway administration and the mining bureau have further strengthened their cooperation to guarantee completion of coal shipment plans, promoted the development of coal production and satisfied the needs of coal users. They jointly established a cooperation leading group consisting of the leaderships of the railway stations and the mining bureau and responsible comrades of concerned departments. The railway administration and the mining bureau both assigned special personnel to work together while each proposed measures aimed at improving existing problems. To understand the source of cargo and the flow of cargo, the railway stations involved took the initiative to contact the mining bureau at the beginning of each month to determine the size of the shipments for the next month, and after changing shifts each day, they also had to establish firmly the inventory, the varieties of coal at each coal mine and at the coal washing plants, and to establish concrete 10-day and daily plans for meeting the demand for cars for coal shipments. At the same time, they also made rational arrangements based on the unloading ability of coal users picking up the shipments at the railway stations and the number of cars required for the shipments. Last year, the mining bureau's annual plans for the amounts of coal for production and for coal concentrate washing directly related to railway transportation were completed 33 days and 45 days ahead

of time respectively. Recently, after the province held a railway, mining and electric power cooperation competition meeting, representatives of the Yongchuan Railway Engineering Section went to Guangshunchang and Shuangshi Railway Stations to propagate the spirit of the meeting, and further established and made sound the system for strengthening cooperation between the railways and the mines. After the responsible comrade of the Guangshunchang Railway Station held a meeting at the Chongqing Branch Railway Bureau to draw up a transportation plan, he also went to the mining bureau to discuss the efforts to draw up the plan and to listen to opinions. The leadership of the Shuangshi Railway Station went into the coal mine's coal storage yards to conduct on-site inspections of the amount and varieties of coal stored to rationally arrange a transportation plan. The Yongrong Mining Bureau considered the actual difficulties in rail transportation and decided to purchase a new gantry crane, three tower cranes and one bulldozer. To lay the groundwork for rail transport, some mines are building new coal storage sheds, studying plans for a system to reload spilled coal, and reorganizing and bolstering the labor force to guarantee fast loading and unloading.

9296
CSO: 4013/101

SHANXI COAL RESEARCH ASSOCIATION, COAL MANAGEMENT ASSOCIATION ESTABLISHED

Taiyuan SHANXI RIBAO in Chinese 7 Jan 83 p 1

[Article by Ji Zhongshi [0370 0002 2514]: "To Make Plans for Building Up the Coal Base, Shanxi Coal Research Association and the Shanxi Coal Management Association Are Established"]

[Text] The Shanxi Provincial Coal Economics Research Association and the Coal Management Association recently held their founding meeting in Taiyuan. The attending experts, scholars and leading cadres in coal economics and coal mangement throughout the province talked freely and presented their own opinions concerning accelerating the buildup of the energy base, improving economic benefits, developing a new situation in the coal industry, conducted conscientious academic discussion and exchanged experience. Some of the papers presented at the meeting had a relatively high standard. They are worth in depth study and practical popularization.

The state has decided to build our province into a coal and heavy chemical industry base. By the end of this century, the output of raw coal throughout the province must surpass 300 million tons, and the coal washing and screening capacity must reach over 180 million tons. Other projects such as living and welfare facilities for workers and environmental protection will also develop greatly. During the discussion everyone believed that in order to develop a new situation in the coal industry, we must rely on policy and progress in science and technology. We must exert a lot of effort to use advanced science and technology, new equipment and new technological processes. We must exert efforts to improve the quality of coal, develop in-depth processing, and gradually change singular business to diversified business. We must also concretely reorganize the enterprises and popularize and perfect the economic responsibility system, carry out technical improvement of mines, and fully develop the potential of existing enterprises.

The conference discussed and revised the charter of the associations, established working rules and reported on the key points, nominated and elected members and standing members, the director and deputy director and the secretary general and deputy secretary general.

9296
CSO: 4013/115

SHANXI PROPOSES REORGANIZATION OF LOCAL COAL INDUSTRY BEFORE 1985

Tiayuan SHANXI RIBAO in Chinese 19 Oct 82 p 2

[Article by Miao Zengguan [5379 1073 0356] chief, Shanxi Local Coal Mining Bureau: "New Situation in Developing Local Coal Industry"]

[Excerpts] In his report to the 12th Party Congress, Comrade Hu Yaobang proposed the mighty goal of quadrupling the total annual production value of China's industry and agriculture by the end of this century. This coincides with the wishes of the whole party and the whole people and with out nation's situation.

After the Third Plenum of the 11th Party Congress, we followed the principle of the Party's Central Committee to develop Shanxi coal as a key point, to build Shanxi into our nation's strong coal energy base, the principle that in the development of Shanxi coal, we must insist on carrying out the methods of the Central government and the local government simultaneously, and we must simultaneously develop large, medium and small projects, with the emphasis on the medium and small projects. Under the present situation in which the state's financial situation is in difficulty and the national economu is being readjusted, we must insist on the path of developing coal mines with waste rock, struggle hard, be self-reliant, be thrifty and entrepreneurial, use mines to support mines, make improvements in gradual stages and actively develop local coal mines so that they can be greatly improved in scale, so that the technical equipment and the degree of mechanization of coal mining can be visibly improved to promote the development of production. In 1981, local and state-run coal mines above the county level throughout the province produced 27,320,000 tons, an increase of 13,050,000 tons over the 14,260,000 tons produced in 1976. A growth of 91.5 percent has been realized over the past 5 years, an increase of nearly one-fold. To double the output in the next 20 years is entirely possible.

In his report to the 12th Party Congress, Comrade Hu Yaobang clearly took the basic links of agriculture, energy and transportation, education and science as the key strategic points to develop the economy. We must insist on building Shanxi which is a strategic region of local coal, to make greater contributions to the general goal of quadrupling the total annual production value of agriculture and industry by the end of this century. Concretely speaking we must first take the improvement of economic benefits

as the center, and firmly reorganize our province's local coal mines and enterprises on an overall basis. Before 1985, we must complete the reorganization of the 257 local and state-run coal mines in stages, and basically realize the standards stipulated by the three major capital construction projects and the six-good requirements. Second, we must carry out technical improvements of existing local and state-run coal mines in stages according to plan and step by step. We must strive to complete the rebuilding and expansion projects at 60 key mines before 1985. By 1990, we should complete the rebuilding and expansion projects of 75 ordinary mine shafts. At the same time, we must build some new shafts according to plan so that the productive capability of local and state-run coal mines can reach 35 million tons in 1985, 50 million tons by 1990 and double again to 100 million tons by the year 2000 from the 24.69 million tons in 1981. Third, we must erform coal mining methods, improve the rate of retrieval of resources, and improve the degree of mechanization. By 1985, all coal mines above the county level must be completely converted to using new methods of mining coal. The output of newly mined coal must reach 85 to 90 percent. High-grade faces should be developed from the current 5 to 50. We should plan to equip several comprehensive mining faces. The degree of mechanization should reach 30 percent by 1985 and 60 percent by 1990. Fourth, we must insist on the principle of safety first in a better way, we must continue to conscientiously reorganize safety, we must improve the ability of mine shafts to resist disasters, and we must realize safe production. Fifth, we must grasp the basic link of providing cultural and technical training for the workers. In 2 or 3 years, we should complete the task of offering supplementary political and cultural classes for young workers and eliminate illiteracy among old workers. Cadres should generally undergo on-the-job technical training on a rotation basis once. The cultural and technical standards of workers must be improved, and modern construction of local coal mines must be pushed forward.

In general, we must exert efforts to build Shanxi's local coal mines well, build Shanxi into our nation's strong coal energy base and continue to make new contributions.

9296
CSO: 4013/31

SHANXI PROVINCE COMPLETES SPECIAL COAL RAILROADS

Taiyuan SHANXI RIBAO in Chinese 3 Oct 82 p 1

[Article: "Shanxi Province Finishes 20 Special Coal Railroads"]

[Text] Special coal railroad construction is developing rapidly in Shanxi Province. To date, a total of 20 coal railroads covering 110 kilometers has been completed and put in use. From 1977 to 1981, 20.23 million tons of coal have been shipped out of the province.

In recent years, local mines in Shanxi have had large-scale increases in production. Local mine production has reached 50 percent of the total coal production in Shanxi. But because of the poor transport capacity, there has been serious pile-up of coal and the production development was adversely affected. In order to change this situation, the responsible departments, under the direction of the national plan, have selected a number of coal mines that are close to railroads and has abundant reserve and good potential for development to build special coal railroads. Due to the enthusiasm and high spirit of the staff and workers and the residents of the local county and municipality, the construction project progressed very rapidly. Since the Third Plenary Session of the 11th Party Central Committee, nine special coal railroads have been built for coal mines at Xing'ergou in Datong municipality, Duizhen in Luliang Prefecture, Yangjian in Shuoxian County, Xucun in Huoxian County, Luzegou in Huairen county, Que'ershan in Zuoyun County, Zhaozhuang in Gaoping County, and Yangfangkou in Xinxian Prefecture. The ability to transport coal out of the province has been greatly improved by these special coal railroads.

Today, 16 local coal mine special railroads covering a distance of 227.3 kilometers are under construction. By the end of 1982 nine more special coal railroads will be completed to increase transport capacity by another 4 million tons.

9698
CSO: 4013/79

SHANXI'S RESERVES COULD SUPPLY WHOLE NATION FOR HUNDREDS OF YEARS

Hangzhou ZHEJIANG RIBAO in Chinese, 30 Dec 82 p 2

[Article: "Shanxi's Coal Reserves Can Supply Whole Nation for Several Hundred Years; Construction Crews From Five Provinces and Regions Gather in Shanxi To Hasten Construction of Energy and Chemical Industry Base"]

[Text] Construction crews from five provinces and autonomous regions have gathered in Shanxi. They are currently accelerating construction on mining shafts and factories along with the local construction teams to develop and utilize the rich reserves of Shanxi coal on an even greater scale.

Results from prospecting already obtained show that the coal reserves in Shanxi top the nation and amount to 200 billion tons. Calculating on the basis of the current consumption level, the coal in Shanxi province alone is sufficient for the whole nation to use for several hundred years.

The supervisory department told New China News Agency reporters that construction workers from Hebei, Shaanxi, Sichuan, Hunan and Ningxia have organized construction crews to assist Shanxi. They were uniformly transferred and assigned by the supervisory agencies of the State Council. At present, over 10,000 people are on the construction sites.

At present, the major construction projects that are being intensively constructed and that will begin soon are the following:

Fourteen pairs of modernized mine shafts which can provide 29 million tons of superior quality coal to the nation each year;

A large-scale open coal pit which can produce 15 million tons a year;

Three large-scale power stations at the mouth of the coal pits which can utilize nearby raw coal to generate electricity and which have a total capability to generate 2,400,000 kilowatts of electricity;

The nation's first large-scale chemical fertilizer plant using coal as raw material can provide 900,000 tons of compound fertilizers for agriculture each year.

9296
CSO: 4013/102

SHANXI ENJOYS NATIONWIDE SUPPORT IN BUILDING ITS COAL BASE

SK170956 Taiyuan SHANXI RIBAO in Chinese 29 Jan 83 p 1

[Text] In order to implement the central authorities' decision on building Shanxi Province into an energy base, 15 units with nearly 40,000 staff, workers, commanders and fighters from the architectural, design, and geological prospecting fronts across the country and from the PLA Railway Engineers have arrived in our province to take part in the construction of major mining zones.

The Gujiao mining zone is one of our country's important bases for coking coal and has been listed in the major construction items of the Sixth 5-year plan. In order to complete the building and to put mines in this zone into production at an early date, the No. 7 Engineering Department of the Construction and Installation Company under the Ministry of Coal Industry, a unit of the PLA Capital Construction Corps and a unit of the PLA Railway Corps are working hard day and night on or under gound. The Pingdingshan Coal-Dressing Design Institute under the Ministry of Coal Industry has taken up the design work for building a coal dressing plant at Xiqu in the zone. The Engineering Department under the Ministry of Nuclear Industry has also signed a contract with the construction headquarters set up for building the mining zone to take part in the construction of the Malan mine in the zone.

The designed capacity of the Pingshuo opencut colliery zone is 15 million tons of raw coal per year and is ranked as one of the five largest opencut colliery zones in the country. In order to accelerate the construction of the zone, the Jiangsu provincial seismological observation team and the No. 173 geological prospecting team of the Geological Bureau under the Ministry of Coal Industry have been stationed in the zone. The Shenyang Colliery Design Institute under the Ministry of Coal Industry is responsible for the designing task of building the zone.

The Luyukou colliery in the Gujiao mining zone is directly under the Taiyuan City Gas Company, and the project of building the mine has a vital bearing on whether Taiyuan City will have a gas supply at an early date. The Mine Construction Department under the Ningxia Autonomous Regional Colliery Construction Company has already joined the operation. The Third Engineering

Bureau under the Ministry of Railways is responsible for laying a special coal transporting line between Luyukou and Zhenchengdi.

Taking part in the construction of the Guishigou mining zone of Yangquan City and the Yanzishan mining zone of Datong City are a unit of the PLA Capital Construction Corps, the No. 119 geological prospecting team of the Geological Bureau under the Ministry of Coal Industry and the Handan-Xingtai Design Institute under the Ministry of Coal Industry. In addition, more than 2,000 staff and workers from the No. 12 Engineering Department of the Handan-Xingtai construction headquarters under the Ministry of Coal Industry have joined the operation of revamping and expanding the Wangzhuang colliery under the Lu'an Mining Bureau. The Handan-Xingtai Design Institute under the Ministry of Coal Industry is also responsible for the design work of building the Chengzhuang mining zone of the Jincheng Mining Bureau.

CSO: 4013/138

YUNNAN COAL MINE SURVEY REVEALS NEW DEPOSITS

HK171010 Kunming Yunnan Provincial Service in Mandarin 1100 GMT 14 Jan 83

[Text] The provincial geological departments have conscientiously carried out geological survey for energy and mineral resources centering on discovering coal. Coal is the main energy consumed in our province. In order to find more coal deposits for the state, since the beginning of last year, the provincial geological departments have organized units of production in scientific research and technical management to make deep-going investigation and vigorously carry out a widespread survey for coal mines. It has been discovered that the coal field on the border of Sichuan, Yunnan and Guizhou, which have been regarded as a key project for long-term surveying, covers more than 3,000 square kilometers in northeastern Yunnan alone. The coal deposit is several billion tons, according to a long-term estimate. The relevant units have promptly drawn up the detailed work plans for work in this area and a general design for establishing a coal mine there. They have initially clarified the number of layers of coal that are exploitable, the thickness of the layers and the quality of the coal. Thus they have provided scientific data for the long-term development of our province's coal mining.

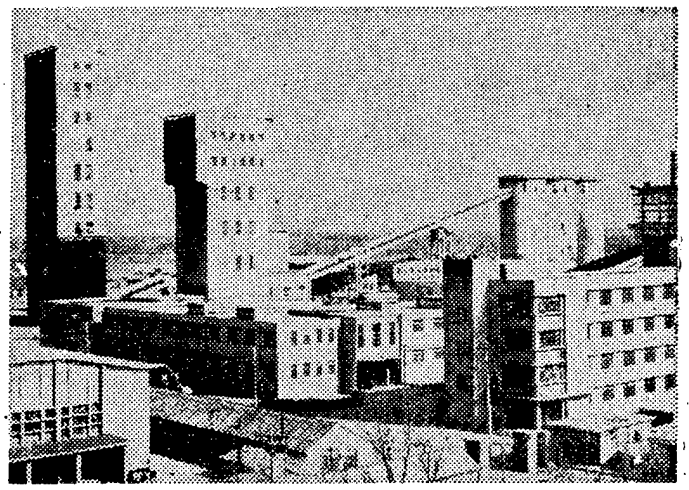
The coal mine in Fuyuan is an important coal field that has recently been developed. Recently, the provincial geological department has sent some labor forces to strengthen the work of the widespread survey in the area around the coal mines in order to find coal deposits for future long-term exploitation. In order to overcome the shortage of coal in some counties and cities in western Yunnan, since the beginning of last year, all the geological survey teams have respectively set up survey groups and carried out survey for non-industrial coal with the aim of satisfying the urgent needs of these areas for coal.

CSO: 4013/133

NEW ANHUI MINE HAS CAPACITY OF 1.2 MILLION TONS A YEAR

Beijing GUANGMING RIBAO in Chinese 27 Feb 83 p 1

[Photograph and caption]



The Huaibei Zhuxianzhuang mine in Anhui Province has recently been completed. Now in production, the mine has a design capacity of 1,200,000 tons of coal a year.

CSO: 4013/155

SERIOUS LOSS OF COAL SHIPPED ON THE CHANG JIANG DECRIED

BEIJING RENMIN RIBAO in Chinese 29 Dec 82 p 8

[Article by Wang Xianyi [3076 0341 5030] of the Party Committee Office of the Nanjing Steamship Transport Company in Jiangsu: "Loss of Coal in Chang Jiang Shipping Serious"]

[Text] In recent years, I have travelled with our company's cargo ships to a coal transfer station and to some coal unloading wharves in Jiangsu and Anhui and I have seen with my own eyes that the waste and loss in loading and unloading coal and in the shipping process is very severe.

1. Loading cargo is muddled. The coal shipped to various places in Jiangsu and to Hubei, Anhui, Zhejiang, Jiangxi and Shanghai by water from the coal base at the Pukou Wharf in Nanjing amounts to 600,000 tons a month. Here, they rely completely on mechanized loading of coal and can load on the average of 16 tons per minute. Inland water shipping on the Chang Jiang is mostly on small lighters below the 100-ton class, so one of them is filled in 6 minutes. However, the operator who controls the mechanized conveyor belt cannot see clearly the full load market when loading coal and must rely on the lighter's crew for this and if there is the slightest lack of caution and the belt is turned off a half minute too late, it will load 8 tons of coal. This extra coal overflows the cargo hold and falls into the river. According to the crews there are three wharves in Pukou where the coal falls into the river like this, which is at least 2,000 tons of coal annually. In addition, some ships become overloaded with coal beyond the load line (and are not permitted to sail), so they dump the coal into the river.

2. Unloading coal is not thorough. When unloading coal, it should be weighed and the tonnage verified, then the coal scattered in the hold should be swept up. However, almost none of the cargo receiving units weigh or verify the coal, nor do they sweep the holds. So a few of the local residents row up in small boats and day or night sweep the holds clean using this as a way to make their living. A 100-ton coal lighter can provide one-half to 1 ton of coal.

3. Loss in transit is great. In shipping coal by water over long distances, waves should be avoided and there should be facilities for keeping off

rain, but at present, except for small lighters which close off holds, other decked lighters pile it up exposed to the elements with only a low splash guard around it. According to statistics, it takes a 1,000-ton decked lighter 7 days to go to Wuhan and the waves and rain en route cause losses of at least 30 tons or more. A 5,000-ton decked lighter can lose 150 tons of coal in one trip.

4. Some crew members use coal for barter. On some boats which transport coal, especially boats which do not specialize in transporting cargo, some crew members will exchange coal for food, oil, domestic animals, and for such building materials as bricks, tile, sand and rocks while in transit. Once, three motorized junks of the Baoying Shipping Company were loaded with 40 tons of coal for Taixing when one of the ships exchanged one ton of coal for 250 catties of husked rice. Some crew members have also stolen coal to sell. Once, 12 lighters of the Yancheng Shipping Company were loaded with 620 tons of coal. While sailing to Huaian in northern Jiangsu, someone sold 40 tons of coal at 80 yuan a ton to a privately owned kiln in the vicinity and netted 3,200 yuan.

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SICHUAN STUDIES PLANS TO CONVERT FROM GAS TO COAL

Chengdu SICHUAN RIBAO in Chinese 18 Nov 82 p 2

[Article by Gao Yutian [7559 1342 1131]: "Adjusting Industrial Fuel Structure--Promoting Continuous Economic Growth"]

[Text] The overall shortage of energy resources in our province has become a major factor that impedes economic development. Achievement of a stable growth rate in the economy of our province will be determined to a great degree by the manner in which we shall solve the problems of energy resources. A radical solution of our province's energy problem depends on a vigorous development of our waterpower resources, which are superior to those in every other region of the country, and also on a speedy development of coal mines. However, the development of waterpower resources as well as coal mining will require a lengthy period of time and cannot bring a breakthrough in a few years. We must therefore seek a way out by economizing energy and by adjusting the structure of energy consumption to alleviate the present predicament of energy shortages and transform the restrictive factor into an impellent factor.

In which direction should we launch the main attack in the adjustment of the energy consumption structure? How is the adjustment to be carried out? Before we answer these questions, let us first of all analyze what the main contradictions are in the overall shortage of energy. Due to faulty energy policy in the past, an excessive number of industrial units were designed to use natural gas as fuel, and, even more inappropriately, a large number of industrial furnaces and kilns that originally had used coal were converted to gas burning. A considerable number among these, furthermore, burnt gas in their boilers at a very low heat efficiency and wasted large amounts of natural gas. A survey in Chongqing revealed that at the 143 old boilers, with a total capacity of 389 tons per hour, the heat efficiency was below 30 percent. The Chongqing Steelworks has two steam rolling mills of high horsepower with a history of 123 years, driven by four boilers with a capacity of 10 tons per hour, which consume about 100,000 cubic meters of natural gas per day with an efficiency below 3-5 percent. The consumption of natural gas as fuel in industrial furnaces and kilns throughout the province exceeds by far the production of synthetic fibers, etc. The consumption of natural gas rose dramatically, going up more than ten times in less than 10 years. In 1981 the consumption of natural gas amounted to one-sixth of the total

consumption of the four common energy resources. Due to the imbalance in exploitation and reserves, it became difficult to satisfy demand and about 40 percent of the industrial production capacity could not be activated. As the use of natural gas exceeded the peak of extraction, supplies had to be adjusted and cut down, which created serious contradictions between supply and demand. Among the four common energy sources, coal, electricity, gas and petroleum, gas is therefore the central issue of the problem. Adjustment of the energy consumption structure thus amounts to replacing gas by coal and electricity and cutting down on natural gas consumption in the industrial fuel structure. The reasons are: the energy consumption structure in our province is most irrational, leading to an excessive exploitation of natural gas. The amount of proven common energy resources throughout the province available for economic development amount, on an annual basis, to an equivalent of 250 million tons of standard coal, among these waterpower and electricity amount to 80 percent, coal to 16 percent, natural gas to 3 percent; the amount of petroleum is very small. However, the energy consumption structure in our province in 1980 was: coal 70.15 percent, natural gas 17.5 percent, waterpower and electricity 7.9 percent and petroleum 3.2 percent. The serious imbalance between natural gas supplies and reserves, the great shortfall in the ratio of gas extraction, if continued for long, will have the whole chemical and synthetic fiber industries in our province, which require natural gas as raw material and which are technically advanced industries of conspicuous economic effectiveness, facing a crisis after not too many years, a crisis that will have inestimable consequences for the entire provincial and national economy. From the standpoint of the economic interests as a whole and our long-term interests, it is very urgent to effect an adjustment in our industrial fuel structure.

To the question whether substituting coal and electricity for gas in an adjustment of our industrial fuel structure is feasible, we have to answer in the affirmative. All of Chongqing, for instance, has 38 gas-burning boilers with an evaporation capacity of 1,116 tons per hour. They burn 1.13 million cubic meters of natural gas per day, which accounts for 56 percent of the city's total consumption. After the city government instituted firm measures and adopted a correct policy, the conversion of boilers was speeded up. In less than 1 year, 121 boilers with an evaporation capacity of 411 tons per hour have been converted, and gas consumption was reduced by 390,000 cubic meters per day. Another 26 boilers now under conversion with an evaporation capacity of 130 tons per hour, will reduce gas consumption by another 190,000 cubic meters. The main measures that had been taken were: (1) Carrying out changes in proposed programs. (2) Carrying out changing in funding; using funds for the tapping of resources, reforms and reconstructions primarily for such technical reconstructions that would save energy consumption, and also adopting such helpful measures as bank loans, state subsidies and raising funds in the enterprises themselves. (3) Adopting a responsibility system with rewards and penalties, by giving a small portion of the saved value as a reward to the boilermen or staff involved. (4) Supplying coal and giving preference in such supplies to those who sign long-term coal supply contracts after converting from gas to coal. (5) Carrying out a policy of allowing factories that have converted boilers from gas to coal to retain a small portion of the gas thus saved and with the approval of the municipality and

the party committee, have it used for civilian purposes (but installing meters and charging fees). This policy aroused enthusiasm for conversion from gas to coal. The Chongqing Textile Mill No 2 required only a little over half a year to convert two boilers of 6.5 tons per hour evaporation capacity to coal burning and reduced its consumption of gas from 12,000 to 2,000 cubic meters per day, a saving of 83.4 percent, which is of benefit for the state, the factory and the staff and workers. By the mentioned method, the Chongqing Municipality achieved a healthy and speedy development in the work of converting from gas to coal.

To convert industrial fuel use from gas to coal is a very arduous job, but it is also a task that brooks no delay. Early conversion is voluntary, later conversion will be involuntary and those who do not convert will have no prospects at all. To exert ourselves for a few years, to basically convert all the industrial furnaces and kilns throughout the province, to change from forcibly accelerated exploitation to scientific extraction, to raise the ratio of reserves to extraction, to concentrate the use of our limited resources of natural gas primarily for the economically most effective chemical industry, synthetic fiber industry, other such industries and special technologies, to ensure the livelihood of our urban population, to raise the efficiency of energy uses, to adjust the use ratio of natural gas within the energy consumption structure to an appropriate proportion, all these are the key items for raising economic effectiveness and this is one of the major tasks in the overall economic adjustment throughout our province.

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BRIEFS

GANSU COAL MINE CONSTRUCTION--Lanzhou, 2 Jan (XINHUA)--Construction of the Weijiadi Coal Mine, which will have an annual capacity of 1.5 million tons upon completion in 1986, is under way in Gansu Province's Jiangyuan mining area, the provincial coal department said. It will be the largest shaft mine in Gansu and has verified reserves of 320 million tons, the department added. First-phase construction of the main and auxiliary shafts and the air shafts has been completed. Two new mines each with an annual production capacity of 300,000 tons as well as two water supply projects, a 45-kilometer-long railway line, and a concrete highway bridge were completed in 1982 in the Jingyuan mining area. The department said four more coal mines are being built in the province, one designed to produce 300,000 tons annually and the others 90,000 tons each. Gansu put 75 million yuan into coal projects last year. Construction on two other mines at the Jingyuan mining area designed to produce 450,000 tons and 300,000 tons each will begin in the first half of this year. Gansu's verified coal reserves are 6,000 million tons. Completion of these new mines will alleviate coal shortages in the province and facilitate industrial growth, the department said. [Text] [OW042114 Beijing XINHUA in English 0704 GMT 2 Jan 83 OW]

NEW ANHUI COAL MINE--Hefei, 27 Dec (XINHUA)--Construction of a coal mine with an annual production capacity of 1.2 million tons was completed here today in Anhui Province, east China, according to a provincial mining official. Located in the Sudong coal field where the reserves are said to be rich and accessible, the Zhuxianzhuang coal mine, north of the Huai He, is near the Beijing-Shanghai railway line and will be one of the coal suppliers for the Baoshan Iron and Steel Complex which is under construction near Shanghai. The project was started in 1976. Coupled with the mine, a coal dressing plant with an annual capacity of 1.2 million tons is still under construction and is expected to be completed next year. [Text] [OW042130 Beijing XINHUA in English 1135 GMT 27 Dec 82 OW]

HEILONGJIANG COAL MINES--Harbin, 24 Jan (XINHUA)--Expansion and development of 15 coal mines with an annual designed capacity of 10.08 million tons are under way in four large mining areas in Heilongjiang Province, China's third largest coal producer. When the projects are completed, the province's coal department said, Jixi, Hegang, Shuangyashan and Qitaihe mining areas are expected to produce 44 million tons of coal annually, nearly 30 percent more than the present 34 million tons. Of the 15 projects, 6, with a total design capacity

of 3.9 million tons, were started this year while the other 9 were begun last year. When expanded, Xingan mine at Hegang will have a designed capacity of 3.6 million tons, among the country's largest. The state has allocated 210 million yuan this year in addition to 180 million yuan last year for these projects, the department said. According to another report, the state and the provincial government had earmarked an additional 560 million yuan for revamping and mechanizing coal mines in Heilongjiang from 1979 to 1982. [Text] [OW241012 Beijing XINHUA in English 0708 GMT 24 Jan 83]

NATIONAL COAL RESERVES--Beijing, 3 Jan (XINHUA)--China verified 79.88 billion tons of coal reserves in 1982, bringing the national total to more than 700 billion tons, according to the Ministry of Coal Industry. Shanxi Province ranks first in the country in coal reserves--more than 200 billion tons--and Nei Monggol second, with 190 billion tons, the ministry said. In addition, Shaanxi, Guizhou and Anhui provinces and the Ningxia Hui Autonomous Region each have verified coal reserves exceeding 20 billion tons, the ministry added. [Text] [OW032120 Beijing XINHUA in English 1106 GMT 3 Jan 83 OW]

SHAANXI COAL PRODUCTION CONFERENCE--An urgent conference of the coal mines of the Shaanxi Provincial Coal Bureau on production was recently held in Tongchuan. The conference called on the goal front throughout the province to make good preparations for work around the spring festival in order to ensure an increase in production in January and February. The conference pointed out that the provincial coal system overfulfilled its annual quota last year and that in January, due to some leaders' complacency and relaxation, coal production dropped. To change this situation, on 13 and 14 January, the provincial coal bureau held an urgent conference on production. The conference demanded that leading cadres at all levels on the coal front throughout the province improve their work style and go deep into the frontline to direct production and solve problems, when found. As a result, since 14 January, output of coal in the province has quickly increased and the average daily output is some 3,000 tons more than in the first 10 days of January. [Xi'an Shaanxi Provincial Service in Mandarin 1130 GMT 20 Jan 83 HK]

NORTHEAST CHINA COAL COMPANY ESTABLISHED--Beijing, 21 Dec (XINHUA)--The State Council has approved the formation of the Northeast China-Nei Monggol Coal Industrial United Company. This multi-provincial company is being founded to coordinate the tapping and marketing of the coal resources in northeast China and Nei Monggol. The company will exercise unified leadership over production of coal in northeast China and eastern Nei Monggol as well as construction, surveying, research and other projects sponsored by the Ministry of Coal Industry in this area. The company, which will be headquartered in Changchun, Jilin, will gradually acquire its own accounting system. Under the direct leadership of the Ministry of Coal Industry, it will pay taxes to the state and will be held responsible for its profits or losses. [Beijing XINHUA Domestic Service in Chinese 0812 GMT 22 Dec 82 OW]

HEILONGJIANG 1982 COAL OUTPUT--Harbin, 20 Dec (XINHUA)--Heilongjiang Province's coal mines whose outputs are under the state's unified distribution system and the province's local coal mines have fulfilled the state's coal production plans for 1982, 13 and 59 days ahead of schedule, respectively. Their outputs are 4.5 and 24.7 percent higher than last year, overfulfilling the state plans by a total of 2.28 million tons. [OW291433 Beijing XINHUA Domestic Service in Chinese 0228 GMT 20 Dec 82]

JIANGXI 1982 COAL OUTPUT--Jiangxi's major coal mines prefulfilled the 1982 coal output and tunneling footage plans by 11 days and 21 days respectively. By the end of December, their coal output is expected to exceed the yearly output plan by 280,000 tons and the tunneling plan by 2,600 meters. [Nanchang Jiangxi Provincial Service in Mandarin 1100 GMT 27 Dec 82 OW]

HUNAN 1982 COAL OUTPUT--By the end of 1982, production output of raw coal throughout the province had already reached more than 20 million tons. The state plan was successfully overfulfilled. The provincial people's government sent message of greetings to coal workers throughout the province and their family members. [Changsha Hunan Provincial Service in Mandarin 2310 GMT 31 Dec 82 HK]

JIANGSU 1982 COAL OUTPUT--By 22 December 1982, Jiangsu Province had produced 15.39 million tons of raw coal, overfulfilling the 1982 production plan by 240,000 tons. The province also prefulfilled annual production tasks for tunnelling footage and coal washing 40 days and 80 days ahead of schedule respectively. [Nanjing XINHUA RIBAO in Chinese 23 Dec 82 p 2 OW]

LIAONING 1982 COAL OUTPUT--The Tiefa Mining Administrative Bureau in Liaoning Province overfulfilled its 1982 annual coal output plan. In 1982, the raw coal output reached 2.6 million tons, a 30 percent increase over the 1981 figure. [Shenyang Liaoning Provincial Service in Mandarin 1100 GMT 5 Jan 83 SK]

NINGXIA 1982 COAL EXPORTS--Xingxia in 1982 exported 150,000 tons of its "Tai Xi coal," compared with 100,000 tons in 1981 and 50,000 tons in previous years. This best quality coal, known for its low content of dust, sulphur and phosphorous and high output of energy, is being exported to Japan, Southeast Asia, Belgium, Britain, France and other countries. [Beijing XINHUA Domestic Service in Chinese 0022 GMT 8 Dec 82 OW]

HEBEI 1982 COAL OUTPUT--As of 28 December 1982, Hebei's unified distribution coal mines had met the state plan for raw coal [output], coal dressing, and tunneling 3 days, 4 days, and 19 days ahead of schedule, respectively. Targets set at the beginning of the year were all realized: volume, efficiency, and profits were all higher than in 1981; coal quality and safety improved over 1981; and raw coal cost and expenditures were both lower than in 1981. The total raw coal production for the province came to 52,960,000 tons, 1,160,000 tons over the state plan. [Excerpts] [Shijiazhuang HEBEI RIBAO in Chinese 4 Jan 83 p 1]

DATONG 1982 COAL OUTPUT--According to SHANXI RIBAO: By zero hour, 21 December, the Datong Mining Bureau had produced 25.5 million tons of coal and had fulfilled its annual production quota 10 days ahead of schedule. A responsible member in charge of production said: By the end of this year, 26.2 million tons of coal will be produced, which will be 1.96 million tons more than the same period last year, equivalent to the annual capacity of a large coal pit. [Text] [HK040240 Beijing RENMIN RIBAO in Chinese 31 Dec 82 p 4]

SHANXI 1982 COAL EXPORTS--As of 15 December 1982, Shanxi Province had prefulfilled its annual plan by 16 days for delivering export coal to ports that are in charge of shipment. Collieries whose product is distributed under the state unified plan delivered 740,000 tons of export coal to these ports, surpassing their annual delivery plan by 37 percent. Collieries run by local units delivered 1.61 million tons of coal, surpassing their annual delivery plan by 0.2 percent. The province scored figure 2.3 times greater than that of 1981 in its total procurement volume of export coal, and one 2.5 times larger than 1981 in its total volume of coal exported. Meanwhile, the province handed over 29.93 million yuan of taxes and more than 100 million of profits to the state. [Taiyuan SHANXI RIBAO in Chinese 19 Dec 82 p 2 SK]

NEW HUNAN COAL FIELD--Concerned geological departments have discovered a major coal field with reserves of over 1 billion tons in Xinhua County, Nengshuijiang City, central Hunan Province. The coal is of the smokeless variety, of high quality, and in thick seams. Preparatory work for its exploitation is now under way. [Text] [Beijing RENMIN RIBAO in Chinese 7 Jan 83 p 1]

CSO: 4013/132

REORGANIZATION OF PETROCHEMICAL INDUSTRY UNDER CENTRAL AUTHORITY DISCUSSED

HK110121 Shanghai SHIJIE JINGJI DAOBAO in Chinese 24 Jan 83 p 3

["Weekly Forum" column by Lang Fengjun [6745 0023 6511] and Zhang Kehua [1728 0344 5478] of the State Commission for Restructuring the Economic System: "Organizing the Petrochemical Industry"]

[Text] For your information:

Petrochemical Integrated Complexes
Percentage Increase in 1982 Over 1981

	Industrial Output Value	Profits Handed Over
Gaoqiao, Shanghai	Plus 2.6 percent	Plus 4.4 percent
Jingling, Jiangsu Province	Plus 7.5 percent	Plus 9 percent
Fushun, Liaoning Province	Plus 0.28 percent	Plus 4.3 percent

China's annual crude oil output has been maintained above 100 million tons for 5 successive years and now occupies sixth place in the world. However, with regard to rational distribution, comprehensive utilization, organization and management, and other fields, China still faces many problems. First, we have burned too large a portion of oil--crude oil burned as fuel amounts to about one-half of our domestic oil consumption, while many valuable raw materials for the petrochemical industry are burned as primary sources of energy. Second, unrefined crude oil directly exported amounts to about 14 percent of the crude oil output. This is really irrational in terms of economics. Third, some large- and medium-sized petrochemical enterprises are weak in comprehensively utilizing crude oil; they only use as raw materials part of the light oil extracted from crude oil, burning all other ingredients as fuel. The situation in many small-sized oil refineries and petrochemical enterprises is even worse. The value produced by 100 million tons of crude oil in our country is far below the standard in highly industrialized countries and, moreover, we even lag behind developing countries in this respect.

The reasons for this situation are manifold. Apart from the too-high portion of burned oil and the irrationality of the price system, the major reason is that our decentralized administrative system fails to keep in line with the actual development and prevents us from allocating and utilizing our petroleum resources in a planned and unified way. Also, being unfavorable to the comprehensive utilization and processing of petroleum resources, this system seriously affects economic results.

The characteristics of the petrochemical industry are that while the various productive elements are closely related to each other, products and enterprises also supplement each other to form an organic whole. A rational organizational structure of enterprise must be able to speed up the development of the petrochemical industry, facilitate the full utilization of petroleum resources, and improve economic results. In light of the development of several local petrochemical enterprises founded last year, the adoption of unified management can considerably enhance economic results. Such petrochemical enterprises as the Gaoqiao Plant in Shanghai, the Jinling Plant in Jiangsu Province, the Fushun Plant in Liaoning Province and so on, still scored remarkable economic results although the amount of processed crude oil did not increase, and may even have decreased. If we rationally organize all large- and medium-sized oil refineries and petrochemical enterprises throughout the country and exert centralized leadership and unified administration of the production, supply and marketing systems; of manpower, material and financial resources; and of domestic and foreign trade, we will be able to boost the petrochemical industry and score more remarkable economic results.

Therefore, it is necessary to cater to the demand of production development, uphold the principle of comprehensive utilization of resources, remove the barrier between departments and between areas and separate large- and medium-sized oil refineries and petrochemical enterprises and large-sized chemical fiber enterprises from their respectively related departments and areas to form a nationwide general petrochemical corporation as an organization to exercise centralized leadership, unified planning and unified administration. This is not only the inevitable trend of the development of the modern petrochemical industry, but also an important approach to speeding the development and further enhancing the economic results of the petrochemical industry, as well as realizing quadrupling. On the other hand, this measure will also provide valuable experience for finding a new path which, conforming with the actual situation in our country, will speed up the development of the national economy as a whole. Under the guidance of the spirit of the 12th CPC Congress and with the strong support and effective coordination of the related departments and areas, the General Petrochemical Corporation of China, a brand new enterprise organizational structure for the petrochemical industry, we believe, will emerge in response to the needs of the times and open a new chapter in the history of the development of China's petrochemical industry.

CSO: 4013/140

NEW FIELDS MAY MAKE GOAL OF DOUBLING OUTPUT BY YEAR 2000 POSSIBLE

HK020852 Shanghai SHIJIE JINGJI DAOBAO in Chinese 10 Jan 83 p 6

[report from Beijing by Li Weiyao [2621 1218 1031]: "China Has the Resources To Double Its Annual Oil Output"]

[Text] "Doubling our annual oil output by 2000 is possible, as far as our resources are concerned." This is what Sai Feng, an adviser to the Ministry of Geology and Minerals, recently told this reporter.

Deposits Estimated at 30-50 Billion Tons

Sai Feng said that the original estimate for our petroleum and natural gas deposits at 30-50 billion tons is relatively conservative in light of existing data available. Proved petroleum deposits have to date reached only several billion tons. At present, our newly discovered petroleum deposits have fallen behind the needs of the development of exploitation. This is what we usually call "an imbalance between deposits and exploitation." Its causes are many. There are also problems in regard to both theory and technology. But the main reason is that in the past 10 years or so, we have stressed opening up oil fields and neglected the matter of making surveys. He said that some major oil-producing countries in the world pay great attention to work preparatory to the opening up of oil fields. Generally speaking, spending on drilling machines used for petroleum exploration is in proper proportion to what is spent on drilling machines used for development and prospecting. In some cases, the ratio is 1-1. In our country, the ratio is 1-10. In the future readjustment of the economy, we must correctly handle the relationship between the opening up of oil fields and the conducting of surveys to look for oil. We must combine an increase in deposits with an increase in prospecting, and advance steadily.

Sai Feng said that there are three main aspects of the effort to increase geological deposits.

Deposits of More Than 13 Billion Tons in the East

1. The eastern area, including the Songliao Basin and the Huabei Basin, is our country's major oil-producing area. Through increasing the depths of old oil fields and expanding their boundaries, we can add to our deposits.

Meanwhile, by making surveys of new territories and new types [of oil], we can discover a number of new oil and natural gas fields. By doing a good job in these two respects, we can greatly add to our deposits. Initial investigations show that the Songliao Basin and the Huabei Basin have a total area of about 600,000 square kilometers, with more than 13 billion tons of resources. What we have tapped is far less than this amount. We hope to discover another several billion tons. In recent years, in the surrounding areas of old oil fields and at depths below 4,000 meters, quite large amounts of geological oil deposits have been obtained.

Offshore Deposits More Bountiful

2. Along the coast, there is the continental shelf, including the Bohai, the South Yellow Sea, the East China Sea, the Pearl River estuary and Beibu Wan in the South China Sea, and Yinggehai, and other large seabed basins. In the Bohai Basin, about 100 exploratory wells have been sunk in succession, and several dozen of them produce oil. The Pearl River estuary of the South China Sea has an area of 150,000 square kilometers. Its prospective oil and natural gas deposits far exceed the prospective deposits of any proven oil field in our country. It is expected that beginning in the second half of 1983, the areas of the South China Sea and the South Yellow Sea, for which tenders have been invited, will have large numbers of drilling rigs in operation. In the latter part of the 1980's, offshore oil fields will go into production. By that time, there will be a new increase in our oil output.

Future Hopes Lie in the West

The northwest area, including Xinjiang, Qinghai, Shaanxi-Gansu-Ningxia and the Hexi corridor, represents our country's future hope for oil. The Tarim Basin has an area of 610,000 square kilometers. The prospects for its oil and natural gas are very promising. In 1977, the Ministry of Petroleum Industry discovered a high-yielding oil and gas flow at the Xihefu structure southwest of the basin. In recent years, the geological departments have made strategic surveys in East Tarim and North Tarim and obtained important geological results. There, a desert of more than 300,000 square kilometers exists. Prospecting is extremely difficult. Given the development of our economy and technology, the Tarim Basin will become an important area of our country, as far as large increases in our reserve deposits are concerned. The Junggar Basin and the Qaidan Basin of Qinghai are also areas with extremely good prospects for oil and natural gas. Now the northwest area has concentrated experienced geophysical prospecting teams equipped with advanced seismic equipment, in order to accelerate the effort to prospect for oil and natural gas in the western area.

New Types of Oil and Gas Discovered in Opening Up New Areas or New Territories

Sai Feng believes that to achieve an important breakthrough in oil reconnaissance and prospecting and discover more and better new oil fields is no mean achievement. We must work hard, for that matter. He said that almost all major oil-producing countries in the world have doubled their oil deposits

only after discovering new types of oil and gas in opening up a new area or new territory. An initial investigation shows that our country has 8 new types and about 36 new territories or new areas that call for energetic efforts in surveying and prospecting. Meanwhile, we must also develop and use new techniques, new methods and new theories. After 30 years of work, those oil fields, which involve shallow deposits and simple geological structures and which are easy to discover, have almost all been unearthed. Those that remain untapped are relatively hard nuts to crack. If we still apply the old ideas, old methods and old equipment of the 1950's and 1960's, we can hardly ascertain geological structures at deep layers. Only with new leaps achieved in awareness and theory can there be a new breakthrough in oil surveying and prospecting.

CSO: 4013/131

ACCELERATED GROWTH OF CHINA'S PETROLEUM INDUSTRY URGED

Beijing GONGREN RIBAO in Chinese 25 Oct 82 p 3

[Article: "Our Country's Rapidly Developing Petroleum Industry"]

[Text] China was one of the first countries to discover and use petroleum and natural gas. But at the birth of New China in 1949 our nationwide annual output of crude oil was only 121,000 tons, the annual drilling production of several middle-sized drilling rigs was not more than 4,500 meters, and the petroleum processing industry produced only some 10-odd simple petroleum products.

During the First Five-Year Plan period we built the first natural petroleum base, the Yumen oilfield, and discovered and developed the Kelamayi oilfield in Xinjiang and the Lenghu oilfield in Qinghai. During this period, annual crude oil output increased by 27.1 percent a year, and in 1957 crude oil output was 1.458 million tons, while natural gas output was 70 million cubic meters. The joint campaign at the Daqing oilfield was organized in 1960, and relying solely on our own capabilities we explored its reserves and began their development, self-reliantly building China's largest oil base, the Daqing oilfield. In 1963 Premier Zhou Enlai solemnly announced that China had become capable of producing all of the oil it needed.

By 1978 the crude oil output passed the 100 million ton mark, and our crude oil output, which had been 29th in the world in the 1950's, had jumped to 8th, putting us for the first time among the world's main oil-producing countries.

Our offshore oil exploration is proceeding, and the first round of tender invitations for offshore oil development is in progress; relatively large-scale exploratory drilling will begin in 1983.

China currently has 122 oil and gas fields under development, more than 9,700 kilometers of oil pipeline has been built, and the oil regions of East China and North China have been largely connected into the crude oil pipeline network, while the crude oil from the main oilfields of Daqing, Liaohe, Dagang and Shengli can be sent by pipeline directly to harbors and refineries. The crude oil which our country produces not only satisfies domestic needs but is also exported to many countries. The petroleum industry has already become an important department which supplies energy to the national economy and is creating accumulation funds for the four modernizations.

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CSO: 4013/51

EXTENT OF CHINESE PETROLEUM RESOURCES DESCRIBED

Beijing GONGREN RIBAO in Chinese 25 Oct 82 p 3

[Article: "China's Vast Petroleum Resources"]

[Text] In recent years many Chinese and foreign petroleum geologists have made a comprehensive analysis of our country's potential oil and gas reserves, with rather gratifying results.

Geological surveys of China's vast territory have discovered more than 300 sedimentary basins suitable for oil exploration, with a sedimentary rock area of 4.5 million quare kilometers, in addition to more than 1.2 million square kilometers of continental shelf, forming an abundant basis for our petroleum reserves, with very broad distribution. Foreign petroleum geologists estimate that the resources are about 30 to 100 billion tons. Our experts believe that an estimate of 30 to 60 billion tons is more reasonable.

The oil and gas prospects for our continental shelf are also very good. To date, petroleum geologists have carried out petroleum geology surveys on more than a million square kilometers of territory and have discovered six oil and gas basins, namely the Bohai, Southern Yellow Sea, East China Sea, Yinggehai, Beibu Wan and Pearl River basins. These basins are not only large, but are connected with the main continental oil regions, and high-output gas wells have already been drilled in them. In 1981, wells drilled by the Ministry of Geology and Minerals hit high-pressure gas strata and oil-bearing sands, and this July a flow of natural gas was obtained in a test, which was a new breakthrough for oil and gas surveying and exploration in the China Sea Basin. The search for oil is doing even better in the South ChinaSea. Since 1979 our country, in cooperation with more than 40 foreign oil companies, has conducted geophysical prospecting and oil and gas reserves estimates for the South China Sea and Pearl River, Yinggehai, Beibu Wan and southern Yellow Sea areas and has discovered more than 400 oil- and gas-containing structures. Investments in offshore oilfields will begin in the late 1980's.

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OIL CORPORATION COOPERATES WITH FOREIGN FIRMS

OW130828 Beijing XINHUA in English 0729 GMT 13 Jan 83

[Text] Beijing, 13 Jan (XINHUA)--The China Petroleum Engineering Construction Corporation signed nine agreements and five contracts with foreign firms in 1982, Shan Yongfu, corporation general manager, said here today.

One of China's largest petroleum project contractors, the corporation is currently in contact with more than 60 companies in 13 countries including France, West Germany, Italy, Iraq, Kuwait, Japan and Canada, he said.

In the past several years, he recalled, the corporation completed several refineries, more than 20 sets of oil-processing units and three large oil storage facilities in five European and Asian countries.

The corporation also works on domestic oil projects, such as technical upgrading projects of the existing oil and gas fields, construction of petrochemical plants, oilfield petrochemical projects, offshore oil projects, refineries and their retooling.

It has helped build several hundred oil and gas fields, dozens of large and medium-sized oil refineries, petrochemical works and laid more than 10,000 kilometers of long-distance oil and gas pipelines of various diameters, he said.

The company employs more than 130,000 engineers, technicians, managerial personnel and skilled workers in several construction teams. In 1982, two of the teams won state gold medals for their work. Only 32 such medals were awarded last year in China, he added.

CSO: 4010/41

ACADEMY OF SCIENCES, OIL INDUSTRY PLAN JOINT STUDIES

OW050751 Beijing XINHUA in English 0702 GMT 5 Jan 83

[Text] Beijing, 5 Jan (XINHUA)--Scientists from the Chinese Academy of Sciences have established a long-term cooperation agreement with colleagues from the Ministry of Petroleum Industry in the area of oil exploration and development, according to the Chinese Academy of Sciences.

The representatives of the two organizations held a four-day working conference at the end of last year.

They plan a joint study of petroleum geology in northwest China, Mesozoic and Cenozoic oil-bearing sedimentary basins in and South China Sea continental shelves. A central focus of the undertaking is research into problems involving technologies in sea-bed oil exploration and development. Their cooperation agreement also covers new methods and technologies in oil drilling, collection and transport.

Professor Lu Jiaxi, president of the Academy of Sciences, told XINHUA, "This cooperation, so large in scale, is the first of its kind since 1949. It is bound to have a bright future and will yield fruitful results."

The cooperation involves more than ten institutes of the academy, including institutes of geology, geography, paleontology, chemistry and metal research.

Scientists of the two departments will hold a series of specialized conferences to study details for cooperation.

CSO: 4010/41

DAQING OILFIELD SETS PRODUCTION GOALS

OW160856 Beijing XINHUA in English 0712 GMT 16 Jan 83

[Text] Daqing, 16 Jan (XINHUA)--Daqing, China's leading oilfield, has set the goal of maintaining production at 50 million tons through 1990 and raising its industrial and agricultural output value from 1980's 5.6 billion yuan to between 12 and 15 billion yuan by the end of this century.

According to the development program worked out by the Daqing oilfield administration, the oilfield, which was opened 23 years ago, will maintain the present production level up to 1987, mainly from the existing oil wells and through application of new technology. In the final three years of the plan, some petroleum will come from newly added reserves.

Since 1976, the oilfield has maintained a high stable output. It is estimated that last year's output will be 51.94 million tons, slightly more than that of 1981, the administration said.

Refining capacity at Daqing will be raised from the present 4.5 million tons to 5.3 million tons by the year 2000 and 140 kinds of petroleum products with an annual output value of 2.4 billion yuan, twice as much as in 1980, will be produced.

The 300,000-ton capacity ethylene plant, which is being built, will have all 13 sets of equipment in operation by 1990 and it is estimated that annual output value will reach 1.64 billion yuan.

CSO: 4010/41

ECONOMICS OF USING FUSHUN OIL SHALE TO GENERATE POWER REVIEWED

Beijing NENG YUAN /JOURNAL OF ENERGY/ in Chinese, No 5, 25 Oct 82, pp 7-8

/Article by Zhou Hongtao /0719 3163 3447/, Bai Qingxiang /4101 1987 4382/, and Wang Baoming /3769 0202 2494/: "Suggestions on the Comprehensive Use of Oil Shale in Fushun To Generate Electricity"/

/Excerpts/ Today, the Xilutian Mine of Fushun abandons over 2 million tons of mineral-rich oil shale in its disposal dump. The First and Second Petroleum Refineries in Fushun discard about 1.5 million tons of granules and pulverized shale of less than 8 millimeters in size from the dry distillation furnace. All are used to fill emptied mine shafts. Analysis of the various geological sections of the Xilutian Mine shows that the abandoned oil shale has an average thermal output of 1,510 kilocalories/kilogram. If the shale is used as fuel, it would be equivalent to 435,000 tons of standard coal. At present, the exploitable reserve of mineral-rich oil shale of the Xilutian Mine has a service life of 27.5 years. Because oil shale is a byproduct of the coal mine, it can be utilized comprehensively. This is an investment that does not require construction and an energy resource that does not require excavation costs. Such a resource should not be wasted over a prolonged period.

For a long time, oil shale stripped from the Fushun Coal Mine has been used mainly in dry distillation to extract shale oil, and the oil is then refined and sent to power plants for firing boilers.

According to the method of dry distillation to extract shale oil, every 1 million tons of oil shale can only be refined to produce over 30,000 tons of oil, and to refine 1 ton of shale oil requires consumption of water, electricity and steam (at the First Petroleum Refinery, this is equivalent to 4.88 million kilocalories) equivalent to half a ton of shale oil. The remaining limited amount of shale oil is used to generate electricity. Its thermal efficiency is very low. Facts prove that such a method of utilization cannot fully develop the maximum effect of oil shale resources and it is very irrational. It would be better to use oil shale directly for firing boilers to generate electricity. This does not require any huge oil refining facility or invesment, and it can also greatly improve the efficiency of utilization of the thermal energy of oil shale.

In industry, oil shale is used in power plants by directly firing it in boilers to produce steam to generate electricity. This method has a long history of use in the world's nations. The Soviet Union has built oil shale power stations with an installed capacity of 1.6 million kilowatts on the Baltic Sea in Estonia. Romania has also built four generators with a total output of 1.32 million kilowatts of electric power. In 1975, West Germany's (Baboge) company designed a 1 million-kilowatt power plant fired by oil shale for Morocco. As early as 20 years ago, our Fushun Power Plant and the First Petroleum Refinery in Fushun mixed oil shale with coal for firing in pulverized coal boilers to generate electricity. In 1957, the Maoming Petroleum Company began to test fire oil shale in suspension boilers in Nanchang City, Jiangxi Province and in Yangjiang City, Guangdong Province. From 1964 to 1966, it built medium and small fluidized-bed boilers using oil shale as fuel, and at the beginning of 1978, the Longkou Power Plant in Huang County, Shandong Province, built a 35-ton/hour suspension boiler that is fired by a mixture of lignite and oil shale. Later, this boiler underwent an experiment to fire oil shale alone. From this, basic data for designing oil shale-fired boilers of larger capacity were obtained. All of these have explored and accumulated experience in using oil shale to directly fire fluidized-bed boilers to produce steam to generate electricity.

To promote the direct use of oil shale for firing boilers to generate electricity, the oil shale power station built earlier tested the 35-ton/hour pulverized coal boiler of the Maoming Petroleum Company in 1977. The experimental results showed: 1) When the thermal output of oil shale was 950 to 1,000 kilocalories/kilogram, oil shale can burn steadily without mixing in oil. The boiler can produce the specified amount of steam and reach the specified steam parameters. This is a better working condition for combustion. But when the thermal output of oil shale is less than 950 kilocalories/kilogram, firing oil shale by itself will produce uneven combustion, the fire easily goes out, and at this time, oil must be added to help combustion. The thermal value of the oil added produces about 15 percent of the total thermal value of the fuel of the boiler; 2) Under working conditions in which only oil shale is fired, the efficiency is 72.2 to 78.5 percent; 3) After making observations by shutting off the boiler many times, serious caking inside the boiler chamber did not occur and the accumulation of soot and ash on the convection heated surfaces was not serious; and 4) The hammer-type coal grinder can guarantee the required load of the boiler when grinding oil shale, and the output can reach 24 tons/hour, higher than the labeled output of 15 tons/hour of the coal grinder. These data have pointed out a new future for the development and utilization of oil shale.

The advantage for Fushun City to use discarded oil shale as fuel for generating electricity is that the oil shale has an average thermal output of 1,510 kilocalories/kilogram and a water content of 2.76 percent. The quality is good. It is worth pointing out that the use of oil shale as fuel to generate electricity in Fushun can save the Xilutian Mine an annual cost of several million yuan to transport oil shale to the dump for disposal, and it can also utilize such oil shale No 1 fuel which does not require investment in construction and which does not require any excavation cost to reduce the cost of fuel that constitutes about 60 percent of the cost of generating

electricity. The investment in construction of a power plant fired by oil shale and the cost of generating electricity are thus much lower than ordinary power plants fired by coal fuel and heavy oil. This condition for comprehensive utilization is rare among oil shale power plants in our nation and abroad.

Starting out from the actual situation in Fushun, the ideal plan for comprehensively utilizing discarded oil shale is to convert the boiler of the Fushun Power Plant from firing coal or oil to firing oil shale fuel. There are advantages. This is because the Fushun Power Plant is only 5 kilometers from the Xilutian Mine and there is railroad transportation. With such conditions, this old plant that consumes a rather large amount of coal to general electricity (the consumption of coal to generate each kilowatt-hour of electricity reaches 466 grams) can be converted into an oil shale power plant and each year several hundred thousand tons of coal can be conserved. This eases the conflict between supply and demand for coal in Liaoning Province and reduces the pressure on railroad transport.

Of course, the technical and economic problems in using oil shale as fuel to generate electricity must be sufficiently noted. Therefore, conscientiously testing and exploring clearly the intensive nature of oil shale are very beneficial. 1) One question is whether pulverization will greatly increase the consumption of electricity. According to related data, the organic substance in oil shale is a high polymer complex of carbon, hydrogen and oxygen. The volatile content is high. After heating, it easily evaporates. When dry distilling oil shale, the organic substance will deoxidize when heated to 350°C. When heated to 600°C, the organic substance in the shale will mostly form combustible gases and leave very little fixed carbon. The volatile characteristic of oil shale determines that in pulverization, even when the pulverized granules are coarse, oil shale will not delay ignition. To conserve electricity in pulverization, the pulverized oil shale does not have to be very fine. According to experiments, when the one-time blowing rate is increased to 75 percent, the consumption of electricity for pulverization is only 8.4 kilowatt-hours/ton. This is insignificant in affecting the cost of generating electricity and operation. Because oil shale has a large ash content, damage to the coal grinder due to wear is more serious. Thus, it is suitable to select and use the fan grinder with a hammer loaded in front of the belt and fitted so that the hammer can be replaced while the boiler is operating. To improve work efficiency in pulverization at the power plant, we can also install a jaw crusher at the Xilutian Mine. The supplier can directly provide pulverized granules after initial crushing. 2) The other problem is how to solve the problem of residual ash that will increase several times. Because oil shale is characterized by a high ash content, we can consider using an electric vacuum to reduce the amount of flyash. Because the residual ash of shale contains many inorganic minerals, we can use it to make shale cement, silicates, shale ceramsite and its fibrous products and other such building materials. The Soviet Union has used it to improve acidic farmland. Because of the specific conditions in Fushun, residual ash of oil shale is also a safe and reliable filler for the Fushun Coal Mine. It is abundant in quantity, cheap, light weight, strongly permeable by water, non-combustible and it is a local material. Compared to filling by river sand, it can greatly reduce the industrial cost of the coal mine and be more comprehensively utilized.

9296
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STUDY SUPPORTS FEASIBILITY OF USING SICHUAN NATURAL GAS FOR RESIDENTIAL USE

Beijing NENG YUAN /JOURNAL OF ENERGY/ in Chinese, No 5, 25 Oct 82, pp 4-6

/Article by Gao Yutian /7559 1342 1131/ and Chen Zehong /7115 3419 3163/:
"Exploring the Feasibility of Supplying Sichuan's Natural Gas to Cities for Civilian Use"/

/Text/ Gasification of fuel for civilian use in cities is an important way to improve the efficiency of energy utilization and it is a requirement of urban modernization and modernization of people's life. At present, the problem of gasification in cities has received popular emphasis in our nation. What are the ways to realize urban gasification? We will explore the scientific nature, the rationality and the economic nature of supplying Sichuan Province's natural gas for civilian use, especially its feasibility, to stimulate more in depth discussion.

I. Supplying Natural Gas for Civilian Use Is Scientific

1. Supplying natural gas for civilian use is urgently needed to protect the urban environment. Since the newspapers launched the discussion on "the possibility that Chang Jiang will become another Yellow River", and especially after the especially large flood in Sichuan in 1981, ecological problems have received some attention. But, the problems of environmental pollution in the large and medium cities in Sichuan have still not been emphasized. Fuel for civilian use in cities up to now still consists mostly of anthracite which has a high sulfur content and a large ash content. According to estimates, 800,000 households in the large and medium cities of Chengdu and Chongqing burn about 1.2 million tons of such inferior quality coal each year. This releases 50,000 tons of SO_2 and over 100,000 tons of flyash into the air and produces more than 400,000 tons of coal sinder. Because of a lack of sulfur and dust removing facilities and tall chimneys, and because the atmospheric pressure is low and the wind velocity is small in the Sichuan Basin, the ability to dilute, purify and disperse harmful gases is poor, and thus the atmosphere of air for breathing by urban residents is seriously polluted. Data measured by each monitoring station of the environmental protection departments of Chongqing and Chengdu show that the measurements generally surpass the health standards promulgated by the state and some even surpass the standards by several times.

2. Natural gas is the best source of gas for gasification of a modern city: 1) It has a high thermal value and superior quality. Because the distance of transporting gas for civilian use is long, therefore the gas with the highest thermal value should be selected. In this regard, natural gas is the most ideal source gas; 2) It is safe. All combustible gases are characterized by ease of ignition and ease of explosion. Although some fuel gases can provide combustion, but they contain toxic CO gas, therefore we should select a gas that is non-toxic and that has a narrow range of explosive concentration for civilian use. Among the above described conditions, natural gas is also the more ideal source gas; and 3) Its supply is stable. Gas for civilian use in cities must be stable and reliable. It is best to have two or more sources of gas. In this regard, conditions in the large and medium cities of Chengdu and Chongqing are good. Generally there are two or more sources of gas. The second is the unevenness in the use of gas. Mealtimes during the day and holidays are peak gas consumption periods and the supply must satisfy these peak demands. The third is the pressure of the gas supply. Because the distance of transporting gas for civilian use in cities is long, the pressure of the source of gas must be high. In general, among these demands and conditions, natural gas is the best source gas.

3. The supply of natural gas for civilian use is an important milestone in urban modernization and the modernization of people's life, and it is the road of development experienced by all nations of the world in common. Because natural gas is clean, its thermal value is high, it is easily stored and transported, it has gradually become the best source gas for civilian use in modern cities. Not only do nations with rich natural gas resources rely on it to realize gasification in cities, even nations poor in resources must also import large amounts to supply the cities for civilian use. For example, Britain spent 10 years to complete the converstion from artificial coal gas to natural gas. According to reports, this conversion can conserve 1 billion pounds for Britain each year. Japan imports large amounts of low temperature ($-180^{\circ}C$) liquefied natural gas from Indonesia and such nations each year. The liquefied gas is heated by seawater and gasified in Japan to satisfy nearly 90 percent of the amount of gas for domestic civilian use. Today, among the sources of gas for civilian use in cities of many nations such as the United States, Britain, France, Canada, Japan, the Netherlands and the Soviet Union and Romania, over 80 percent are natural gas. Sichuan Province should not start out from the use of coal to produce gas anymore in its selection of the source of gas for urban gasification. It should start out from the actual situation, suit measures to local circumstances, develop the superiority of natural gas resources in Sichuan and directly use it as the source of gas for civilian use in cities.

II. Supplying Natural Gas for Civilian Use Is Economical

1. Energy Conservation

Let us make a comparative analysis of the following three aspects.

(1) Replacing coal for civilian use by gas

If coal for civilian use in cities is replaced by natural gas, the gain in energy conservation will reach over 200 percent. Estimates show that the thermal efficiency of coal for civilian use in the cities of Sichuan is generally about 18 percent but the efficiency of gas for civilian use reaches 55 percent. The replacement of coal by gas can increase the thermal efficiency alone by two-fold. Calculations using a thermal value of 8,500 kilocalories/cubic meter for natural gas and 5,000 kilocalories/kilogram for raw coal show that each cubic meter of gas is equivalent to 1.7 kilograms of coal. When we take thermal efficiency into consideration, each cubic meter of gas is equivalent to 5.3 kilograms. Each cubic meter of natural gas used for civilian use can realize a net conservation of 3.6 kilograms of raw coal, i.e., an energy conservation of 212 percent. Calculations based on using an average of 125 kilograms of coal and 25 cubic meters of gas per urban household per month show that each urban household can conserve about 1 ton of coal a year. If all large and medium cities throughout Sichuan are 70 percent gasified, 800,000 households can conserve 800,000 tons of raw coal a year from the conversion of coal into gas, equivalent to the current total annual output of a large coal mine in Sichuan.

(2) Comparison of gas for civilian use and gas for industrial fuel

Comparison of the results of different facilities using gas to conserve coal shows that the gain from energy conservation is generally higher than that of using gas as industrial fuel by 2.5 to 3.5 times. According to calculations, each cubic meter of natural gas can conserve 3.3 to 4.3 kilograms of coal while common industrial boilers that use gas conserve only 0.4 to 0.7 kilograms of coal. The worst is the electric power generating boiler. Every cubic meter of gas used conserves only 0.1 kilograms of coal.

(3) Comprehensive examination

The gain in energy conservation in using gas for civilian use is over 2.5 times that of using gas to fire industrial boilers. Estimates show that the present medium sized industrial gas-fired boilers consume 90 cubic meters of natural gas to produce a ton of steam. That amount of natural gas is sufficient for use by 100 households for one whole day. The 100 households have to use 420 kilograms of coal a day for living. If the 420 kilograms of coal are used to fire boilers, they can at least produce 2.6 tons of steam. This means, if the fuel of present industrial boilers and the fuel for civilian use are exchanged, one ton of coal will become 2.6 tons of coal. It can thus be seen that converting the gas used by industrial boilers as fuel for civilian use and converting the coal for civilian use into industrial fuel will reduce the energy consumption of the whole society. This coincides with the macroeconomic benefits and this is economical and rational.

2. Reduction of Transportation

The amount of coal transported to the cities for civilian use and the exportation of coal sinder is larger than the sum of the amount of food grains and vegetables shipped. The transportation problem is the second most difficult problem besides environmental control and a major burden in modern cities.

Take Chongqing City as an example. At present, the residents use about 800,000 tons of coal for living each year. If the coal is shipped by rail over 150 kilometers and by highway over 15 kilometers, then throughout the year, the amount transported will reach 120 million tons-kilometer and 12 million tons-kilometer. The 800,000 tons of coal are distributed to thousands and tens of thousands of households after arriving in the city. This requires thousands and tens of thousands of laborers to move the coal. Comparison between coal for civilian use in cities and coal for industrial use shows that the shipping distance is long, there are more intermediate transfers, and coal for civilian use must be mixed with about 20 percent of mud and lime, therefore, the amount of processing is large and the amount of transportation is even larger, loss is also high and a lot of energy is wasted. Natural gas is supplied for civilian use via natural gas pipelines. This will reduce the burden on transportation, conserve land, and benefit the improvement of the economic results of the whole society.

3. Saves Time, Makes Things Convenient for the People

Each urban family now spends generally 3 to 4 hours on three meals a day. When natural gas is supplied for civilian use, this time will be greatly reduced. This not only liberates the broad masses from the heavy burden of household chores, it also enables them to allocate more time to learn and rest. Therefore, the broad masses have regarded gasification as a "revolution" in family life.

4. The Conservation of Capital Benefits the Nation and the People

Natural gas supplied for civilian use is better than "coal gas" and "mixed gases" for civilian use. Here, we will take Chengdu as an example. Many problems have emerged since 1979 when Chengdu City began supplying small amounts of "mixed gases" to some of the urban residents. Not only because furnace coal gas was toxic, also, the mixture of coal gas of a low thermal value (1,200 kilocalories/cubic meter) and superior quality natural gas (8,500 kilocalories/cubic meter) was uneconomical. This was because first, if all the gas supplied for civilian use was natural gas, each household would require only 0.8 cubic meters a day. When using "mixed gases", each household would require at least 1.4 cubic meters a day, and this would increase the load in the urban pipeline network by onefold. The diameter of the gas transport pipes would have to be enlarged by 29 percent, the amount of steel used would increase 20 percent, and investment in capital construction would increase 25 percent. If the whole city uses this type of "mixed gases", the more than 360 kilometers of natural gas supply system and the combustion facilities already built would all have to be rebuilt. Second, the coal gas from the generating furnace is low pressure coal gas. It must be pressurized before it can be channeled into the city's pipeline network. Pressurizing 1 cubic meter of coal gas consumes 0.1 kilowatt-hour of electricity. If the generating furnace produces 360,000 cubic meters of coal gas a day, pressurization alone would consume 36,000 kilowatt-hours more electricity. This not only is an additional consumption of secondary energy, it also increases the cost of transporting and distributing the gas. Third, the city has already

spent 22 million yuan in investment to build the generating furnace coal gas plant. But because it was impossible to realize comprehensive utilization and some other reasons, the cost of coal gas reached a high of 0.198 yuan/cubic meter. The deficit was serious. In 1981, deficits reached nearly 3 million yuan. Therefore, Sichuan must not supply coal gas for civilian use and it is also uneconomical to mix coal gas with natural gas for civilian use.

III. The Plan to Supply Natural Gas for Civilian Use Is Feasible

Although the methods of gasification of large cities in our nation and abroad are different, but they should all follow the principle of suiting measures to local circumstances, develop the advantages and avoid shortcomings. Sichuan lacks liquefied petroleum gas, surplus industrial gas and gas produced from oil. At present, it is impossible for them to become the major sources of gas gasification in cities, but natural gas is relatively rich and it is the best source of gas for the gasification of the cities in Sichuan.

1. How much gas for civilian use in cities is required?

Although Sichuan has very good sources of gas, it would be good if within 5 to 10 years, the 800,000 households in the large and medium cities throughout the province could begin to use natural gas, realizing a 70 to 80 percent gasification. If each household uses 1 cubic meter of gas a day, and with the amount of gas used by the cities' public welfare facilities (such as restaurants, hospitals, kindergartens), the total amount of gas used a day would not surpass 1 million cubic meters and the annual total would be 365 million cubic meters. This figure is only 9 percent of the amount of gas used as industrial fuel. It is feasible to convert 1/10 of the natural gas used as industrial fuel for civilian use and this coincides with the overall situation of energy conservation.

2. As long as we strengthen management and develop potential, we can increase the rate of gasification in cities by onefold without increasing the present amount of gas for civilian use.

In Sichuan there are about 300,000 urban households using natural gas (130,000 in Chongqing, 120,000 in Chengdu, 50,000 in Zigong, Yibing, Luzhou. Because of poor management and inappropriate policy, the wasting of natural gas resources is astounding. Up to now, less than half of the 300,000 households have installed meters, and with poor burners and cooking equipment and poor use, each household generally uses over 2 cubic meters of gas a day. Some individual households in the Luzhou Prefecture even use as much as 10 cubic meters. Conversely, as long as the situation is rectified, management is strengthened, meters are installed in every household, the daily use of gas will visibly drop. Chongqing City conducted a survey showing that before the situation was rectified, each household used an average of 2 to 3 cubic meters. After the situation was rectified, the figure dropped to about 0.8 cubic meters. As long as we strengthen management, change contract fees to measured fees, we can develop new household users while not increasing the total amount of gas used for living. Concretely speaking, throughout the province, an additional 300,000 households and even more urban residents could use natural gas.

3. We should rebuild industrial boilers and various kilns in a big way and change the direction of distribution of natural gas.

At present, Chongqing City uses 3 million cubic meters of gas a day. Of this amount, chemical raw materials and special technological processes use less than 40 percent while various industrial boilers and kilns use over 60 percent of the gas. In many enterprises up to now, there are still many "gas tiger" boilers. In the past, Chongqing had 238 boilers consuming 1.13 million cubic meters of gas a day. In 1981, 121 boilers had already converted back to firing coal, conserving 390,000 cubic meters of gas a day. Because of the policy stipulating that "whoever converts back can, with approval, use a small portion of the amount of natural gas conserved to develop gas for living", the rebuilding of boilers progressed rather quickly. Take the Chongqing Cotton Mill No 2 as an example, it completed rebuilding the facilities to substitute coal for gas in only 5 months, converting two 6.5-ton/hour boilers to firing coal and at the same time, developed gas for living for 800 households. As a result, the plant's daily gas consumption dropped from 12,000 cubic meters to 2,000 cubic meters. In reducing the amount of gas used as industrial fuel and in changing the distribution of natural gas, we must first satisfy the need for gas in the production of raw materials and special technological processes. It is feasible to divert a small portion of the amount of gas conserved by the substitution of coal for gas in industry for civilian use.

4. Although Sichuan is relatively rich in natural gas, but as industrial production and agricultural production develop and as the people's standard of living rises, there is a problem of shortage in the sources of gas. How can it be solved?

First, we should develop sources of gas in selecting the sources of gas for civilian use. For example, Chongqing's Zhongliangshan Ward is rich in well gas. At present, it is released without being utilized. If this fuel gas can be utilized, it is entirely possible to provide gas for the 100,000 households of coal miners and residents of nearby towns. Second, we should establish a complete natural gas storage and dispatching system to facilitate cutting the peaks and filling the troughs so that the supply for living and the supply for production will both be taken care of. Third, more importantly, we should actively develop coal gas to satisfy the need in industrial production after superior quality natural gas fuel is supplied to the cities for civilian use as a priority. Some large enterprises in Sichuan Province mostly were equipped with coal gas generating furnaces in the past. After repairs, they can be re-utilized. Also, factories can utilize coal gas more economically and rationally than civilian use of coal gas.

1) Industrial departments can use unrefined coal gas without a high degree of purification. 2) Building coal gas plants in large enterprises can greatly shorten the distance of transporting gas. This does not require pressurized transport and it can utilize potential heat and improve the efficiency of energy utilization. 3) In general, large and medium enterprises all possess such public projects as water supply facilities, power supply facilities, transportation facilities and such basic facilities as boiler

room, oxygen gas station, and air pressurization station. Fully utilizing these facilities will greatly reduce capital construction and maintenance and operating costs. 4) Facilities of large industries have a strong adaptability to various types of fuel gases.

In summary, we can see that supplying natural gas for civilian use in Sichuan is economical and feasible.

9296
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OIL AND GAS

DEVELOPING NATURAL GAS IN SICHUAN'S OIL FIELDS

Chengdu SICHUAN RIBAO in Chinese 17 Sep 82 p 1

[Text] The great efforts expended by the staff and workers on Sichuan's petroleum front in the development and production of natural gas are a great contribution toward solving the problem of our shortage of energy resources and toward implementing the new phase in the socialist modernization drive outlined by the 12th National Party Congress. In August the Sichuan Petroleum Administration achieved brilliant exploits by an above-quota production of over 5.2 million cubic meters of natural gas, over 5 km of well drilling and opening up three new gas wells of great industrial value. In the period from 1-12 September the administration's total output of natural gas already fulfilled 41 percent of the plan for the month and its well drilling 45 percent of the monthly quota. Natural gas production and well drilling were greatly increased compared with the corresponding period of last month.

The convening of the 12th National Party Congress was an extremely inspiring event for the staff and workers at the Sichuan petroleum front. In his political report, Comrade Hu Yaobang pointed out that the shortages in energy resources and transportation were major factors impeding our country's economic development. To ensure a certain rate of progress in our national economy, we must enhance the development of our energy resources. The staff and workers engaged in our petroleum undertakings, who are directly charged with the development of energy resources, enthusiastically responded to Comrade Hu Yaobang's appeal and in high spirits, relating the achievement of the great strategic goal to their own work, produced more natural gas and drilled longer distances. The staff and workers in the southwestern and southern mining district of Sichuan adopted a variety of technical measures to enhance the scientific management of the old gas fields and gas wells, in order to exploit their natural gas potential. The leading cadres of the mining areas led engineers and technicians in separate groups right up to the well sites for an investigation and analysis of the reserves of natural gas, the geological conditions of water and gas pressures at each old gas field and old gas well, and then put into effect technical measures for high and stable yields, ensuring gas supplies through the long-distance pipelines. The staff and workers in the East Sichuan mining area exerted themselves in their work and during the time of the 12th National Party Congress had gas production and drilling work overfulfill their plan quotas every day.

At present the members of the party committee at the Sichuan Petroleum Administration and the leading engineering and technical cadres are in the course of conscientious studies of the documents from the 12th National Party Congress. They are grasping the spirit of the 12th National Party Congress and in the attitude of masters of their own affairs do a solid job, striving for a new breakthrough in natural gas exploration and exploitation in our province during the next 3 to 5 years to meet the needs of the continuously developing industrial and agricultural production in Suchuan Province.

During the convening of the 12th National Party Congress, the broad masses of staff and workers of the development command headquarters of the South Sichuan mining area of the Sichuan Petroleum Administration responded to the appeal of the 12th National Party Congress with practical action as they displayed the spirit of self-reliance and struggle against adversity in overcoming difficulties and bringing one group of gas wells into production ahead of schedule, gas wells that produced over 200,000 cubic meters of natural gas per day.

The broad masses of staff and workers of this command headquarters, inspired by the spirit of the 12th National Party Congress, speeded up the production of natural gas and called forth all vigor of the staff and workers of the ninth team at the construction, maintenance and repair shops and gas extraction section, instilled high morale and in only 3 days adjusted and renovated the equipment of "dan" No 9 Well, installed a valve at the wellhead and brought "dan" No 9 Well into operation ahead of time. The staff and workers of gas extraction team No 7 also raced against time in their preparatory work for a new well and brought yet another well into operation without any further hitch. (Xu Shili [1776 1102 4539])

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SINO-JAPANESE NATURAL GAS JOINT VENTURE HAILED AS SUCCESS

Chengdu SICHUAN RIBAO in Chinese 28 Oct 82 p 1

[Article by Chen Ningyang [7115 1337 7122], reporter for PETROLEUM NEWS, and She Jingping [0152 2529 1627], reporter for SICHUAN RIBAO: "The Imported Engineering Project of a Natural Gas Processing Plant at Wolonghe, Chongqing, Goes Into Operation--Ancillary Facilities Also Completed, Design and Completed Project Checked and Accepted by Government as of Excellent Quality"]

[Text] The imported engineering project of China's first natural gas processing plant and its ancillary facilities, newly constructed at Wolonghe, Chongqing, have been in cooperation for one and one-half years and all its major economic and technical data have come up to the values guaranteed in the Sino-Japanese contract. Recently, the plant was checked and accepted by the government and officially handed over for full production. Its construction and the start of its operations are of greatest significance for the opening up of Sichuan's field of highly suphureous natural gas, for raising the level of technological skill in processing natural gas, and the reduction of pollution by the "three wastes."

The raw material for this plant is sulphureous natural gas and it is used to produce clean natural gas and petrochemical industrial products from sulphur. The main components of the plant were imported from Japan. Its ancillary facilities were constructed domestically, and groundbreaking took place in June 1978. As a result of the hard work of the staff and workers participating in the construction, 50,000 square meters of buildings were constructed, 35,000 cubic meters of concrete were poured, over 1,800 different items of equipment were installed and 264 km of various kinds of pipelines were laid. In December 1980, trial production was begun. In March of the same year, the Chinese and Japanese sides signed a "Certificate of Receiving, Testing and Accepting the Contracted Plant for Processing Natural Gas." The ancillary facilities constructed domestically were subsequently also completed.

From the start of its trial runs, the quantity and quality of its products, its consumption figures and its disposal of the "three wastes," all agreed with the values guaranteed in the contract and came up to the production capacity that it was designed for. Up to the end of September of this year, the plant processed over 1.77 billion cubic meters of sulphureous natural gas, produced 1.69 billion cubic meters of clean gas and over 68,000 tons

of sulphur, all adding up to a total value of 78.95 million yuan. Already in the trial run stage over 30 percent of the investment in this engineering project have been recovered.

Most recently, the Ministry of Petroleum Industry was asked by the State Economic Commission to convene a meeting at the site of the Wolonghe plant for the formal testing and accepting of the engineering project. The examination confirmed that the rate of construction, the design and the quality of the completed project conformed to the standards acceptable by the state.

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CSO: 4013/74

BRIEFS

SICHUAN NATURAL GAS PROJECT--China's first natural gas treatment project incorporating foreign and domestic engineering technologies has been successfully completed at Wolonghe in Chongqing. After 18 months of operation, all the major economic and technical targets have been met. It has recently been officially turned over to the state. The major equipment in the Wolonghe natural gas treatment project in Sichuan was imported from Japan and the auxiliary matching equipment was produced in China. It consists of a complete petrochemical system for producing natural gas and sulphur. The planning of the construction began in January 1978 and the ground-breaking was in June 1978. The hard-working staff and workers who participated in this project have completed 50,000 square meters of housing, 35,000 cubic meters of concrete work, installed 1,800 pieces of equipment, 4,900 meters and gauges, 200 kilometers of wiring and pipes and 600 kilometers of power and communications circuits. The system began running on 3 December 1980 and has been operating normally; product quality, technical targets, consumpetion quota and the treatment of the "three wastes" have all met the regulation. As of 30 Septmeber 1982, the system had processed a total of 1.77 billion cubic meters of sulphur-containing natural gas and produced 1.69 billion cubic meters of purified natural gas and 68,000 tons of sulphur and accumulated 78.95 million yjan of production value. [Text[[Beijing GONGREN RIBAO in Chinese 20 Nov 82 p 1] 9698

DAQING 1982 CRUDE OIL PRODUCTION--Daqing, 4 Jan (XINHUA)--Daqing, China's largest oilfield, produced 51.94 million tons of crude oil in 1982, exceeding the annual target by 442,000 tons and hitting an all-time high, according to the Daqing Petroleum Administration. The oilfield has kept its annual crude oil production at more than 50 million tons for 7 consecutive years since 1976, the administration said. The country's petroleum industry produced more than 100 million tons of crude oil in 1982. The administration attributed the sustained increase to improved management, institution of the responsibility system and popularization of new technology. [Text] [Beijing XINHUA in English 0704 GMT 4 Jan 83 OW]

SICHUAN 1982 NATURAL GAS OUTPUT--Chengdu, 8 Jan (XINHUA)--Sichuan Province produced 5.24 billion cubic meters of natural gas last year, 5 percent above its annual production plan, the provincial petroleum department said. The figure is nearly half of the country's total production of 10.8 billion cubic meters in 1982. In addition, the province produced 99,600 tons of crude oil, also topping the state plan. Sichuan, which has more than half of the country's natural gas reserves, mobilized more than 100 drilling rigs for exploration of natural gas and oil. The success rate was raised from the past 50 percent to 60 percent. A number of new oil- and gas-bearing structures and natural gas reserves were discovered last year. Now more than 50 gas fields are in operation, the department said. The province also set up two desulfurization plants last year. One is on the outskirts of Chongqing, with equipment imported from Japan. It has a daily capacity of 4 million cubic meters of natural gas. The other--designed and constructed by the province--was built in the western part of Sichuan. Its daily handling capacity is 600,000 cubic meters of natural gas. [Text] [OW080752 Beijing XINHUA in English 0720 GMT 8 Jan 83]

HEILONGJIANG 1982 OIL OUTPUT--As of 28 December, Daqing petroleum administration had produced 51.5 million tons of crude oil, prefulfilling the state plan by 3 days. This petroleum administration has overfulfilled the annual output plan of 50 million tons of crude oil in 7 successive years. [Harbin Heilongjiang Provincial Service in Mandarin 1100 GMT 28 Dec 82 SK]

SHANDONG 1982 OIL OUTPUT--As of 25 December, Shengli oilfield had prefulfilled the annual plan of producing 16 million tons of crude oil by 6 days, with an increase of 200,000 tons over the corresponding 1981 period. [Jinan Shandong Provincial Service in Mandarin 2300 GMT 28 Dec 82 SK]

CSO: 4013/145

'PROJECT 728': NUCLEAR POWER FOR MODERNIZATION

Beijing GONGREN RIBAO in Chinese 7 Nov 82 p 4

[Article by Hao Huiyou [6768 2585 1635]: "China's Modernization Needs Nuclear Power"]

[Text] I came to Chief Jiang's office troubled and with a feeling of uneasiness.

Comrade Jiang Guaijia [1203 1843 0305] is a famous Chinese nuclear chemist and nuclear engineer who had in his earlier years made outstanding contributions in China's chemical industry. He was transferred to the Second Ministry of Machine Building for China's atomic energy enterprise and for many years worked in an important nuclear plant in the Northwest. He was the chief engineer with a great deal of authority there. Afterwards, he held the office of Vice-Minister of the Second Ministry of Machine Building and is now the Chairman of the Science and Technology Committee of the nuclear industry. Yet, to date, many comrades still cordially call him "Chief Jiang."

Several days ago I told him that the broad mass of readers were very interested in news concerning our nation's construction of a nuclear power plant and that the newspaper office would like to ask him to talk about China's prospects for developing nuclear power. He told me that recently he was very busy and that the next afternoon he was setting out for observations in France. He pondered a moment and then said: "Then come to my office in the morning as soon as work begins."

As soon as I entered the door, I found that I was already the third person. Chief Jiang was discussing processing problems in Project 728--the large-scale facilities of China's first 300,000-kilowatt pressurized water nuclear power plant--with comrade Zhou Zhi [0719 4442], an advisor with the Ministry of Nuclear Industry. I waited on the side.

"Do you know why China's first nuclear power plant is called Project 728?" After comrade Jiang Guaijia apologized for making me wait, he opened up a notebook and began to give me an introduction.

The initiation of China's atomic energy enterprise was carried out under the leadership of the Party Central Committee. Not long after the successful tests of China's first atomic and hydrogen bombs, Premier Zhou Enlai proposed that the "Second Ministry of Machine Building handle the nuclear power station." Under the solicitude of Premier Zhou Enlai, on 8 February 1970, the proposal for the building of a nuclear power plant was announced. "This is the origin of the epithet of Project 728. It was the painstaking effort of Premier Zhou" Chief Jiang said with respect and cherished memory.

When he spoke of China's building of this "pressurized water pile nuclear power plant," Chief Jiang said that the nuclear power plant could be divided into the two large sections of the nuclear island and the conventional island. The conventional island is mainly composed of the steam turbine, generator etc. and is the same as that of a conventional thermal power plant; the nuclear island is mainly composed of the nuclear reactor, steam generator etc. which is equivalent to "boiler" of a thermal power plant. It is also called the "atomic boiler" wherein powerful nuclear energy is produced in the reactor. There are various different types of piles. The pressurized water pile is at present the most advanced in the world and it has been constructed in the greatest number. Its nuclear fuel is a low enrichment uranium, the common water of high enrichment uranium causes the double actions of slowing the neutrons and carrying energy. Under constant pressure, water boils and evaporates at 100 degrees Celsius; in order to raise the thermal efficiency, the water must be heated to a very high temperature and at the same time we do not want ti to evaporate in the pile. This requires maintaining very high pressure and therefore this type of nuclear power plant is called a pressurized water pile nuclear power plant.

I asked Chief Jiang about the fact that many readers were very concerned as to whether or not nuclear power plants were safe. Chief Jiang siad: "As a nuclear scientist and nuclear engineer, I am even more concerned and give more serious attention to the safety of nuclear power than the public. Whether or not nuclear power stations are safe is 1 billion people's assessment of us; how much more so the working personnel who work and live in the nuclear power plant for long periods of time."

Early, in 1974, when the state approved the plan for Project 728, Premier Zhou proposed the four guiding principles of "safety, practicality, economics, and self-reliance" for the nuclear power plant, and among them safety was placed in the first position. Chief Jiang said that beginning from that time the ensuring of safety has been our most important guiding principle. After Chief Jiang explained that a nuclear power plant could not produce a nuclear explosion like that of an atomic bomb, he introduced four "protective screens" used in the nuclear power plant constructed in China to prevent radiation leaking. Firstly, the nuclear fuel is made from a small core piece with a ceramic body. It is high heat resistant, corrosion resistant, does not dissolve water and its performance is steady so that 98 percent of the radioactive material is kept here. Secondly, its outer surface is a jacket made of

zirconium which completely seals the fuel core piece. Thirdly, if by chance the jacket should rputure, because the fuel devices are all in a high pressure resistant large-scale sealed container, the radiation can still be sealed in. Fourthly, if by chance the third protective screen also leaks, there is also the main plant building. It is a completely sealed building which can sustain three pressures.

It can actually be said to be a defense in depth with many protective screens which is perfectly safe," I happily exclaimed upon hearing this. However, Chief Jiang told me that absolute safety does not exist in science and that our responsibility was to make nuclear energy into a safe energy source. For this reason, various safety measures are considered for the most serious and the smallest possible imagined accidents in design and construction. Chief Jiang said that the operating history of over 2,000 pile years of nuclear power in the world shows that nuclear energy not only has a very good safety record in the area of human casualties but it is also a very clean energy source as regards the environment. However, because this nuclear power plant is the first constructed by China there has been exceptionally serious attention given to safety and the key places have all increased thier safety tolerances.

When speaking of the progress of Project 728, Chief Jiang said that China's energy enterprise has a very good tradition. This is the spirit of "energetic cooperation" proposed by Chairman Mao when China was developing its first atomic bomb. The nuclear power project is the first domestically constructed project and it has very high technology, high quality requirements and a very wide area of specializations. The reason why this project has progressed smoothly is due to the energetic support of the ministries and commissions under the State Council and that of the various provinces and cities. It can be said that the construction of the nuclear power plant is a further significant "key point of attack" following the development of nuclear weapons.

Toward the end of the visit, Chief Jiang happily said that since the Third Plenary Session, there has been deeper domestic recognition of the importance of energy resources and a unity of views on the development of nuclear energy. The 12th Congress listed the problem of energy resources as one of the three major strategic focal points and thus our responsibility has become even greater. "China's modernization needs nuclear power and nuclear energy is a strategic energy resource which conicides with China's conditions," Chief Jiang said at the end, "yet the development of nuclear energy has a very long scientific research period, design period and construction period. Beginning from now, we need to have feelings of urgency and responsibility, must act with great foresight and conscientiously begin from ourselves, and try hard to initiate new aspects of the nuclear industry in order to realize the grand objectives of the 12th Congress and make our due contribution.

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CSO: 4013/76

NATION'S FIRST 300,000-KILOWATT NUCLEAR POWER PLANT DESCRIBED

Hangzhou ZHEJIANG RIBAO in Chinese 16 Nov 82 p 4

[Article by Feng Zejun [7458 3419 0689]: "China's First 300,000-kw Nuclear Power Plant"]

[Text] China's first independently designed pressurized water nuclear reactor--the Qinshan nuclear power plant of the Ministry of Nuclear Industry--will be built at Qinshan in Haiyan County, Zhejiang Province. The capacity of this power station will be 300,000 kw. The early phase preparatory engineering projects are being completed. This is another major event in China's peaceful use of atomic energy and development of new energy resources.

The nuclear reactor is the heart of a nuclear power plant. It is equivalent to the steam boiler of a thermoelectric power plant but much more complex in technology. Today, 23 countries and regions have built nuclear power plants. These power plants are pressurized water reactor, boiling water reactor, gas cooled reactor and heavy water reactor as their heat generating source, more than half of the existing reactors are of the pressurized water type. The pressurized water reactors have been well tested, they have a compact structure and a high power density; they are easy to maintain and have a relatively small volume.

The outer shall of the pressurized water reactor is an ellipsoidal high-pressure container made of steel. The reactor China is building measures 10.7 meters tall including the spherical cover seals at the two ends, about the height of a three-story building, and measures 3.7 meters in diameter. The center of the reactor has 120 sets of fuel assemblies 3.5 meters long and 20 square centimeters in square corss section. Each fuel assembly in turn consists of more than 200 fuel rods about 3 meters long arranged in a square lattice and fixed at the top and the bottom by eight layers of egg-basket shaped fastening grids. The outer shell of the fuel rod is made of newly developed high strength zirconium tube and inside the tube it is packed with more than 200 short sections of uranium dioxide fuel blocks having a concentration of 2.4~3.2 percent.

The 120 fuel assemblies make up a 3.5-meter cylinder with an equivalent diameter of 2.5 meters. It is rather like a bunch of new chopsticks tightly held together. This is where the nuclear chain reaction takes place and produces enormous energy.

Highly purified ordinary water is passed through the reactor core, the water is heated to a temperature above 300°C. Since the water is enclosed in a high-pressure system at more than 150 atmospheres, the hot water does not boil. This is how the name pressurized water reactor came about.

The power of the reactor is controlled by control rods. These control rods are made of a material having a strong ability for absorbing neutrons. When the rate of fission in the reactor is too fast and produces too much heat, the control rods will automatically descend into the reactor core and absorb part of the neutrons and the reaction will then slow down and the energy release will also decrease correspondingly. Conversely, if the external load increases the control rods will automatically ascend so that the number of neutrons absorbed will go down and the reaction will speed up to produce more heat to meet the demand of the external load.

The high-pressure hot water produced by the reactor cannot be used for power generation directly. This water is first passed through a steam generator higher than the reactor. From a heat transfer point of view, the steam generator is like a relay. It has thousands of small pipes in which the hot water flows and transfers its heat to the outside of the pipes (i.e., water supply of the return path inside the shall of the steam generator), where it produces 260°C steam at 50 atmosphere. This steam is then fed into the gas turbine which drives the electric generator.

The design of the nuclear power station is quite safe. The design criterion of China's first nuclear power station is "not to pollute the land and not to jeopardize the people." The design has an ample safety margin and the reactor can never explode like an atomic bomb. Because the reactor deploys low concentration U-235 (the concentration is only 2.4~9 percent), its energy is controlled according to the need, it will not explode even if it loses control. An atomic bomb, on the other hand, is different; it uses concentrated uranium (up to 93 percent) as fuel and its energy release is not controlled.

Nuclear power plants are cleaner than coal burning power plants and cause less environmental pollution. In the design the radioactivity of the nuclear power station is strictly enclosed. First the nuclear fuel is enclosed in high strength zirconium tubes, the entire fuel assembly is then enclosed in a sealed stainless steel pressure vessel 200 millimeters thick. Any damage to the zirconium tube will cause the dosage monitor system to send out a signla. In case the zirconium tube and the pressure vessel fail simultaneously, the whole reactor building is still enclosed in a safety shell 66 meters tall, 36 meters in inner

diameter and equipped with spherical cover seals. The reactor, steam generator, main pump and any equipment that may be contaminated by radiation are all enclosed in this safety shell which has a 1-meter-thick wall. Therefore, even if both the zirconium tube and the pressure vessel are damaged, the safety shell can still readily contain the radioactive material inside the shell.

China's first nuclear power station has a 41-ton capacity for nuclear fuel and one-third of it, or 13.5 tons, will be replaced every year. A few trucks will be able to transport this fuel. For a coal-burning power plant, almost 1 million tons of coal are burned every year and hundreds of tons of hazardous gases like carbon dioxide and nitrogen oxide diffuses into the environment every day through the chimneys, plus great amount of ash. In the ash from coal-burning power plants, the dosage of radioactive elements like uranium and chromium alone is three time greater than the radioactivity from a nuclear power plant. Nuclear energy is therefore a clean energy resource.

The cost of producing electricity in a nuclear power station is also lower than that of a coal burning power station. The equipment cost is higher for a nuclear power station, but in terms of long term fuel costs and transportation costs, the equipment cost is insignificant in the cost of producing nuclear power. For a coal burning power station, however, the fuel cost is a significant fraction. In other countries the cost of generating electricity by nuclear power is only 50~83 percent of the cost of generating electricity by burning coal.

Fuel rods of the first nuclear power station designed independently by the Chinese being assembled on a shop bench

9698
CSO: 4013/67

TESTS UNDER WAY ON NATION'S FIRST NUCLEAR POWER PLANT

Shanghai WENHUI BAO in Chinese 20 Sep 82 p 4

[Article by Zhang Lian [1728 1670]: "China Builds Its First Nuclear Power Plant"]

[Text] China is taking a big step in the peaceful utilization of nuclear power and in the development of new energy sources by building its first nuclear power plant.

Nuclear power has undergone rapid development since the 1960's. To date, there are nuclear power plants in 23 countries and regions. The heart of the nuclear power plant is the nuclear reactor. There are two types of nuclear reactors: the thermal neutron reactor and the fast neutron reactor. The reactor to be built in China has a capacity of 300,000 kw and uses pressurized water. It belongs to the thermal neutron type of reactor. More than half of the reactors in nuclear power plants today are pressurized water reactors.

The core of a pressurized water reactor is cylindrical in shape and consists of more than a hundred fuel assemblies, each assembly contains more than 200 fuel rods arranged in a matrix form. The fuel rods are made of high strength zirconium alloy tubes packed with several hundred ceramic uranium dioxide fuel blocks. The reactor core is housed in a cylindrical pressure vessel and the coolant flowing through the reactor core is high purity water. Under the heating of the nuclear fuel, the temperature of the water may raach 300°C or above. Since the hot water is enclosed in a high-pressure system under 150 atmospheres of pressure, the water will not boil and evaporate, hence the name "pressurized water reactor."

The hot water coming out of the reactor core flows through the pipe in a stream generator and transfers its heat to the water in a return pipe, thereby turning that water into steam and driving a turbine generator.

The high-pressure hot water in the reactor core, in addition to serving as a coolant, also serves as a moderator. The function of the moderator is to slow down the high energy fast neutrons released in the nuclear fission and turn them into thermal neutrons (also known as slow neutrons).

These thermal neutrons are utilized to sustain the chain reaction because slow neutrons are more likely to hit the nuclei of U^{235} and cause fission. In this process a small amount of U^{235} is needed to have a sustained chain reaction.

The chain reaction of a pressurized water reactor is controlled by the control rods that have a high ability to absorb neutrons. By pulling the control rods up away from the reactor core, the reaction is initiated and the power output is increased. Conversely, by inserting the control rods down into the reactor core, the power is reduced and the reaction may be stopped. In case that the operation of the reactor deviates from normal, the control rods will be automatically inserted into the reactor core and the chain reaction may be halted immediately to insure safety. The advantages of the pressurized water reactor are its tight structure, small volume and high power density.

Research and testing and equipment design for the first Chinese nuclear power plant are now being carried out actively.

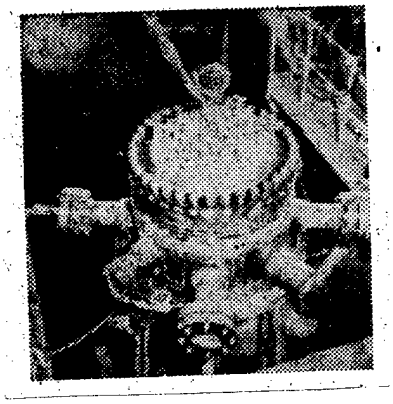

Figure 1

Nuclear power plant zero power experimental reactor designed and built independently by the Chinese

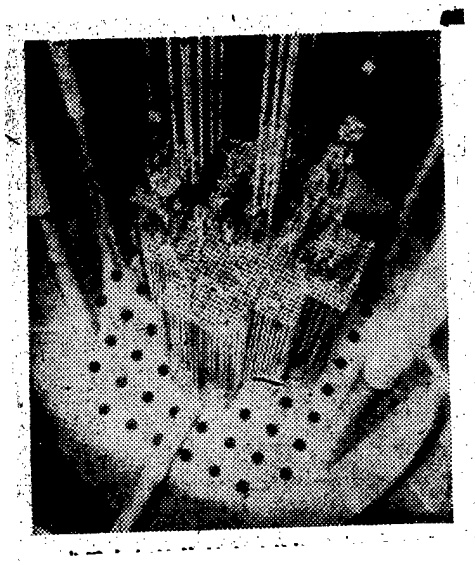

Figure 2

Mock-up of the pressure vessel in a 300,000-kw pressurized water reactor

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CSO: 4013/70

PRELIMINARY WORK ON NATION'S FIRST NUCLEAR POWER PLANT NEARS COMPLETION

Hong Kong MING PAO in Chinese 7 Feb 83 p 21

[Text] Work is being stepped up on the pre-construction phase of China's first indigenously designed and researched pressurized water reactor 300,000-kilowatt nuclear power plant. Today, almost 80 percent of the plant's scientific research, experimentation, and equipment design work has been completed. This nuclear power plant is to be built at Qinshan in Haiyan County, Zhejiang Province. As of mid-January, the hydrographic and geological prospecting work had been basically completed, paving the way for groundbreaking to get under way.

Technicians working on the construction of the nuclear power plant use a nuclear reactor pile experimental facility to conduct zero-power experiments.

CSO: 4013/136

WORK ON NATION'S FIRST NUCLEAR POWER PLANT BEING STEPPED UP

Fuzhou FUJIAN RIBAO in Chinese 17 Feb 83 p 3

[Text] This reporter has learned from concerned organs that the equipment for the first 300,000-kilowatt nuclear power plant to be researched and designed by China is now being rushed to completion.

Shanghai, China's largest industrial city, is handling the bulk of the research and experimentation, materials development, and equipment manufacture for this nuclear power plant. Of the 15 major components needed by the plant, 14 are being handled by Shanghai.

Today, engineering designs for the power plant's reactor pile pressure vessel, steam generator, and pile components have been completed and certified following review by engineers and technicians from the concerned departments. Production prototypes of the control rod drive mechanism and the fuel loading and unloading equipment have been developed and are now undergoing test-stand checks. Construction designs for the steam turbine, the generator, and other equipment will be basically finished this year. The components needed for the reactor containment structure have proceeded from the industrial testing stage to the production stage.

The individual in charge of Shanghai's related manufacturing organs says that 1983 is the critical year for equipment development. In 1983, the engineering designs for most of the major equipment should be finished and design phase experimental projects completed; the work of processing tests, the design and production of the equipment and the preparation of materials must be fully under way. The prototypes of some of the products must be authenticated on the basis of heated-state trials. A batch of the new materials will have to make the transition from factory trial production to regular production. The pressure vessel and other equipment must be capable of going into production in succession in the fourth quarter.

The individual in charge added that in order to speed up the development of nuclear power facilities, the state has made a total investment of more than 130 million yuan to upgrade technically the Shanghai factories involved, some 22 projects in all. Shanghai is now in the process of bringing into play its industrial and technological might to develop China's nuclear power industry.

CSO: 4013/163

SUPPLEMENTAL SOURCES

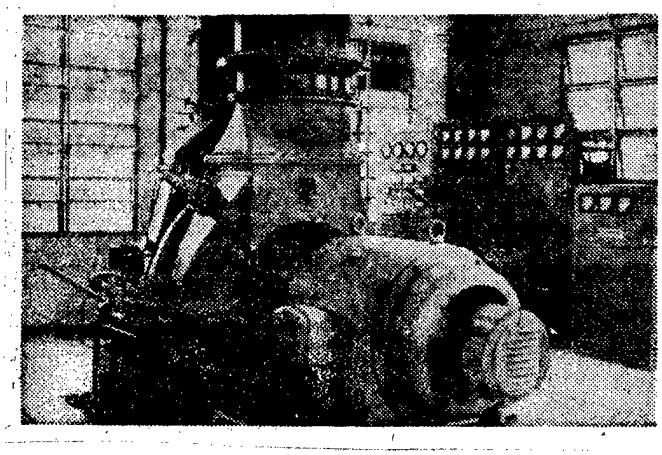
GUANGDONG EXPERIMENTAL GEOTHERMAL POWER STATION MEETS DESIGN REQUIREMENTS

Guangzhou NANFANG RIBAO in Chinese 11 Jan 83 p 2

[Article by Ou Zhiyun [2962 1807 0061]: "Dengwu Experimental Geothermal Power Station's No 3 Generator in Fengshun Is Evaluated, Begins Production"]

[Text] The Dengwu Experimental Geothermal Power Station's No 3 generator jointly built by the Guangzhou Energy Research Institute of the Chinese Academy of Sciences and the Fengshun County Hydroelectricity Bureau and funded by the Guangdong Provincial Science Committee and the Guangdong Provincial Electric Power Bureau was completed at the end of last year.

Not long ago, it passed technical evaluation. Responsible comrades and chief engineers from the Guangzhou Branch of the Chinese Academy of Sciences, the Guangdong Provincial Electric Power Industry Bureau, the Provincial Science Committee and delegates from a total of 29 units including leading agencies of the prefecture, the county, concerned scientific research agencies, design agencies, higher educational institutions, manufacturing plants and geothermal power stations from all over the nation participated in the evaluation. At the evaluation meeting, delegates heard reports on designing, manufacturing, installation and testing of the No 3 generator of the power station. They reviewed related blueprints and technical information, and related units organized joint testing groups to go to the site to test and evaluate the generator. Everyone unanimously believed that the major technical indices of the generator have reached the designed requirements, and agreed to officially begin production. The maximum output of the generator can reach 322 kilowatts, and compared to similar types of generators, it has reached the advanced levels in our nation. Its completion will provide beneficial scientific data and experience in the comprehensive utilization and generation of electricity by geothermal energy and surplus heat in our nation.



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CSO: 4013/115

SUPPLEMENTAL SOURCES

STATUS AND PROSPECTS OF WIND POWER GENERATION IN CHINA

Shanghai DIANSHIJIE [ELECTRICAL WORLD] in Chinese No 7, Jul 82 pp 1-3

[Article by Xiao Gongren (5135 0501 0117) of the Science and Technology Department, Ministry of Water Conservancy and Electric Power]

[Excerpt] With the devleopment of the rural economy since liberation, energy consumption has grown day by day. According to statistics, China's present rural energy consumption is about 40 percent of the total energy consumption of the whole country. Electric power use has grown especially fast in the countryside. However, at present, electric power supply relies mainly on electric networks. Except for the three major metropolitan areas of Beijing, Tianjin and Shanghai and a few counties where the level of electric power use is fairly high, the level of electric power use in the vast countryside is still quite low. Therefore, since 1978, the state has set the study and utilization of new energy sources such as wind power, solar energy, biomass, and geothermal energy, as top scientific and technical items for the whole country so as to encourage the diversification of energy sources in the countryside, which would complement each other, and in due course relieve the lack of energy sources in the countryside.

Several horizontal-axis 6-meter-diameter wind power generators developed by China in the 60's, installed in Xinghua County, Jinagsu Province, with the combined purpose of irrigation, agricultural by-products processing and electric power generation, are still in use. In 1972, the FD-16 horizontal-axis 16-meter-diameter, 18-kilowatt wind power generator was successfully trial manufactured by cutting the rotor of a "Zhi-5" helicopter retired from military service, into blades. In 1977 it was moved from Shaoxing County, Zhejiang Province, to Shengsi County where it is still working today. It has weathered the onslaught of many typhoons (instantaneous wind velocity up to 36 meters per second) which shows that its mechanical strength and performance are excellent. In 1981 Heilongjiang Province also developed a 17-meter-diameter, 20-kilowatt generator of the same type. The FD-1.5 horizontal axis 1.5-meter-diameter, 100-watt and FLD-2/0.25 2-meter-diameter, 250-watt wind power generators developed in the years 1975-1978, were used mainly for electricity for lighting and radios in the pastoral areas of Mongolia, and after undergoing technical appraisal, have been produced in small numbers. Experimental horizontal-axis 4-meter-diameter and 10-meter-diameter, 2-kilowatt and 10-killowatt wind power generators also developed at the same time, were used for lighting and low power in the pastoral areas. The vertical-axis ϕ-type 6-meter generator developed in 1981 has also been given successive test runs.

Distribution and Characteristics of China's Wind Power Resources

Wind power is a form of conversion of solar energy in the earth's atmosphere, produced by the earth's rotation and revolution and by solar-induced temperature differences in the atmosphere and irregularities of the earth's surface. About 2 percent of solar energy is converted to wind and wave power. Wind power does not pollute the atmosphere or upset the balance of nature. However, the density of air is only about 1/816 that of water, and so its energy density is low.

China is located in the southeastern part of the Asian continent bordering the western coast of the Pacific Ocean with strong monsoons. The summer monsoons are southeasterly winds from the tropical Pacific and southwesterly winds from the equatorial Indian Ocean. The effective range of the southeasterly monsoons spreads all over the southeastern half of China. In addition, the southeastern seaboard is often subject to typhoons which blow across the land from the sea. The winter monsoons come from Siberia or the Arctic and are often controlled by cold high-pressure zones. Every year from the beginning of winter until the next change from spring to summer, the winter monsoons last up to 7 months in north China and up to 9 months in northeast China. The Qinghai-Tibetan plateau is affected by high altitude air currents with the west winds prevailing in the winter and spring and the southeast winds more in the summer.

According to statistics from metorological data over the years, the distribution and characteristics of China's wind power resources are:

1. The southeast coast and offshore islands are China's greatest wind power resources area. The average annual wind velocity in places such as Pingtan in Fujian Province and Shengsi in Zhejiang Province, is over 7 meters per second. These areas are also famous fishing grounds of China.

2. The Nei Monggol and Gansu corridor is an area of fairly high wind power density. At the end of the year this zone is usually dominated by northwest winds, and it is the area that bears the brunt of cold waves moving south from Siberia. The wind power there is abundant.

3. Wind power is also abundant in eastern Heilongjiang and Jilin, and on the coasts of the Liaodong and Shandong peninsulas. The Changdao area of Shandong Province for example, has an average annual wind velocity of over 6-7 meters per second and it is also an important agricultural and fishing area of China.

4. Wind power is also abundant on the Qinghai-Tibetan plateau and in northwest and north China. Of those, the Qinghai-Tibetan plateau is the greatest wind power resources area but the wind power there is less than the southeast coast and offshore islands.

From the above it can be seen that large areas of China have abundant wind power resources, especially those places which form a "draft." All of them are ideal bases for electric power generation by wind power. The areas described above with abundant wind power resources, are mostly remote agricultural,

pastoral or fishing areas with poor transportation and communications, and are difficult places to provide with widespread electric power networks. Therefore, the development and utilization of the wind power resources of these areas would be beneficial to agricultural, herding and fishing production and to the living standard of the people, and would have important actual significance and economic value for development.

Development and Experience in Wind Power Generators

Wind power generators take wind power as the energy source, convert the wind power to mechanical energy, then drive the generator through gear trains, and convert the mechanical energy to electrical energy. The blades of the wind power generator are designed as an asymmetric streamline like the wings of an airplane, with a smooth rounded leading edge and a sharp-pointed trailing edge. When an airflow crosses the blade at a certain velocity, the distribution of the streamline above and below the wing is different, causing the windmill to produce torque and rotate. The power of the wind power generator is directly proportional to the square of the diameter of the windmill and to the cube of the wind velocity. The percentage of wind power that can be converted by the wind power generator's windmill, is called the utilization factor. Theoretically, the maximum value is 59.3 percent but usually the wind power utilization factor of a windmill is less than 10 percent.

Wind power generation was first used abroad early in the 20's of this century (see DIANSHIJIE, No 9, 1981: "Development and Prospects of Wind Power Generation"). China began trial manufacture in the 60's, and by the end of the 70's was conducting joint development projects by research units, universities and manufacturing plants organized by the Ministry of Water Conversancy and Electric Power. Two types of prototypes with four levels of capacity, developed between November 1980 and May 1981, that is, the vertical-axis ϕ-type 5 and 6-meter-diameter, and the horizontal-axis 3.2 and 6-meter-diameter wind power generators with capacities respectively of 1, 3, 5 and 8 kilowatts, are used as independent power supplies in areas with wind but without electricity. According to the consumers' needs, they are used respectively for (1) direct-current generator-storage battery fed power supply systems; (2) power supply systems fed by storage batteries after commutation of alternating-current synchronous generators; (3) parallel systems of asynchronous generators with electric network shunts. Each unit was scheduled to undergo a year's appraisal. The 1-kilowatt unit has already passed its year's appraisal and will be produced in small numbers. It operates at wind velocities of 4-50 meters per second. It has been battered by typhoons of 40 meters per second and still continued to generate electric power in a normal manner. A 50-kilowatt prototype developed in 1982, based on the horizontal-axis 19-meter-diameter fiberglass reinforced plastic blade, trial manufactured in 1981, is to be installed at Bada Ling Station in the fourth quarter of 1982 for a trial run. In addition, 40-kilowatt and 55-kilowatt generators both using ex-military "Zhi-5" rotors as blades, are now being tested out.

Generators which have now been installed at the Bada Ling wind power generation testing station, Beijing, include a horizontal-axis 6-meter and a vertical-axis ϕ-type 5-meter and 6-meter as well as an Enertech horizontal-axis 4-meter

introduced from the United States and an Electro GMBH 6.6 meter from Switzerland. The Li Shan wind power generation testing station in Zenhai County, Zhenjiang Province, has a horizontal-axis 3.2 meter and a vertical-axis 6-meter-diameter unit, the British P.I. Company's vertical-axis variable-geometry 6-meter-diameter generator aided by the United Nations Development Program, and the U.S. Dynergy vertical-axis ϕ-type 15-foot-diameter generator. Both testing stations will be conducting performance tests on various wind power generation, and technical appraisals of various generators.

We have accumulated some experience in developing small-sized wind power generators of under 10 kilowatts, mainly:

1. The blade type and quality of manufacture determines the efficiency of the generator. The blade is also the crucial factor affecting the reliability of the wind power generator. For developing generator units, the blade type mostly used is the NACA230xx. This blade type has already had a long trial period abroad. Its test data are fairly complete and its aerodynamic properties are excellent. For the material of the blade, a generator of over 3 meters in diameter would use fiberglass reinforced composite material (popularly called glass steel) because it is light weight, strong, has low notch sensitivity, is easy to mold, has a smooth surface finish after molding, and has good corrosion resistance and weatherability in the environment. Blades made of fiberglass reinforced plastic, if designed properly and manufactured to quality specifications, can last up to 20 to 25 years which is 4 to 5 times more than wooden blades. The drawback is that the manufacturing costs are high.

2. The rotational speed of wind power generators is not high and must be geared up to match the rotational speed of the generator. The gear train is one of the key components of a wind power generator facility. Medium and large-sized generators in particular would best use a planetary gear train. Except for its high cost, its other properties (such as light weight, small volume, high efficiency) are superior to other types of gear trains.

3. In regulating speed, the horizontal-axis 6-meter-diameter generator uses electric power drive to regulate the blade inertia. The 3.2-meter generator uses the centrifugal force and spring action of stabilizer rods for relative equilibrium speed stabilizers to convert the inertia of the blades. The 5-meter-diameter generator with non-starting torque from a vertical-axis ϕ-type windmill uses an S-wheel starter and the 6-meter generator uses an electric starter. Both generators use altered load speed regulation. When the wind speed is too high, the generators' rotational speed is too high and they rely on dampers to limit the rotational speed and assure the safe operation of the generator.

4. Small-sized wind power generators at isolated sites must also be run in parallel with diesel, small battery-operated or small water power generators, supplementing each other so they can be run economically. In addition, if the wind power generator supplies power independently, the problem of power storage and safe power supply for the unit must be taken into account as well as the need to allocate the proper number of storage batteries.

Prospects for the Development of Wind Power Generation in China

Looking at China's abundant wind power resources and the demands for long term energy sources, there is a need to develop large and medium-sized wind power generators. At present, although we have attained certain experience in the development of small-sized generators, we have had great difficulty in manufacturing key components for large and medium-sized generators (such as blades, high-power transmissions and automatic regulating devices), and we should take positive prudent and steady steps forward. In research we should conduct studies on the parameters of wind fields and the aerodynamic properties of rotors. Systems and concerned research units which have not been organized dealing with machinery, aviation, electric power and building materials, and institutions of higher education have jointly produced feasibility reports on the development of large and medium-sized wind power generators, and have carried out scientific research and trial manufacture. We should summarize our experience on small-sized generators of under 10 kilowatts so we may benefit by it. The key problems now are how to raise reliability and lower manufacturing costs for safe, stable and continuous operations. There are then, these important things to do: (1) Conduct comprehensive research on China's wind power resources in cooperation with the scientific research departments of the Central Weather Bureau, and especially first conduct statistical analyses to develop areas with a high priority for wind power so as to provide reliable scientific data for the design and operation of wind power generators and the selection of station sites. (2) Attach importance and reinforce the development of key components for wind power generators, such as the structure, materials and aerodynamic properties of blades, the selection of type of generator for isolated areas, braking devices for regulating speed and direction and guarding against overspeed, and energy storage systems.

Proceeding from China's actual situation, in the near future the development of wind power generation facilities must take the rural, pastoral and fishing areas where there is wind but no electricity, as the main service target areas, while at the same time taking care of small power supply needs such as weather stations, post and telecommunications offices, microwave relay stations, oil pipeline corrosion prevention, and television frequency-modulated transmitting stations. In accordance with the situation described above, China will give prominence to developing small-sized generators of under 10-kilowatts in the near future, and will strive to attain the objectives of rational structure, reliable operation, simple controls and low manufacturing costs. Their specific requirements are: a selling price of about 2000 yuan per kilowatt (though generators of 1-5 kilowatts may be a little higher), a cost per kilowatt-hour no greater than that of a diesel generator (about 0.25-0.30 yuan per kilowatt-hour), a lifetime of 15 years, unmanned operation, and only two maintenance services a year.

7775
CSO: 4013/90

BRIGHT PROSPECTS FOR ENERGY CONSERVATION CITED

Beijing GONGREN RIBAO in Chinese 25 Oct 82 p 3

[Article by Wang Xianglin [3769 4161 2651]: "Great Potential for Energy Conservation"]

[Text] In 1980 the party Central Committee put forward the policy of stressing both development and conservation in solving the energy problem, with conservation receiving top priority in the near term. In the past 2 years, our country's total energy conservation has been equivalent to more than 60 million tons of standard coal, equal to 4 times the crude coal output of the Kailuan Mine. This result has been achieved mainly through readjusting the economic structure, and indicates that there is still great potential for energy conservation.

In recent years our country's energy consumption has been third in the world, but our energy efficiency has been only about half that of the industrially developed countries. Our energy consumption is slightly greater than that of Japan, but the total output of our national economy is only a third of Japan's which means that for the same output value we use several times as much energy as Japan. Our energy consumption indicators are also poorer than the best levels achieved in this country in the past. During the Fifth Five-Year Plan the average national income produced per ton of energy consumed was 55 percent lower than in the First Five-Year Plan. The main reasons for our low energy efficiency are high consumption, high waste and poor economic effectiveness. Some 60 percent of our country's 28,000 electrical and mechanical products have poor capabilities and high energy consumption and should rapidly be replaced or abandoned. Some 30 percent of our country's more than 200,000 industrial boilers, which consume 200 million tons of coal a year, are "coal gobblers" with an efficiency below 60 percent; the average efficiency is more than 10 percent lower than the figure abroad, resulting in an extra coal consumption of more than 30 million tons a year. The country's electrical or diesel water pumps have a total capacity of more than 80 million kilowatts and consume 60 billion kilowatt-hours of electricity a year; their efficiency is 10 to 20 percent lower than foreign and new-model domestic pumps of the same kinds, resulting in consumption of an extra 6 to 12 million kilowatt-hours a year. The losses in the country's electrical transmission and distribution lines are also rather high. If the

existing lines were modernized and the loss rate was brought down to the best past levels we could save 5 billion kilowatt-hours annually.

Obsolete processes have increased energy consumption. Last year total energy consumption per ton of steel produced in this country was 1.9 tons of standard coal, while the figure per ton of synthetic ammonia was 2.7 tons; both of these figures are about twice the best figures abroad. We consume about more than 440 grams of standard coal per kilowatt-hour of electricity generated, a third higher than abroad. If these three consumption indicators could be brought into agreement with advanced foreign levels we could save more than 700 million tons of standard coal a year.

Energy management, measurement and inspection, quota management and the development of an effectively functioning system of rules and regulations are progressing unevenly, and a strict conservation responsibility system is lacking everywhere. According to preliminary statistics, if all of the country's industrial enterprises were to stop only leakage and discharge losses, we could save several million tons of standard coal a year; obviously there is still great unused potential for conservation.

Energy conservation in this country has great prospects. If we strengthen scientific management of energy consumption and carry out effective technical modernization centered on conservation, our country's energy efficiency would undoubtedly increase rapidly and energy conservation work would inevitably make its appropriate contribution to our country's accomplishment of its vast strategic objectives.

8480
CSO: 4013/51

VIGOROUS DEVELOPMENT, CONSERVATION OF ENERGY RESOURCES URGED

Beijing GONGREN RIBAO in Chinese 25 Oct 82 p 3

[Article by Ma Yi [7456 0308], vice chairman, State Economic Commission: "Vigorously Develop and Conserve Energy Resources"]

[Text] Energy is an important material basis for developing the national economy and an important factor constraining our economic development; it is a critical strategic problem that must be solved in order for us to triple our industrial and agricultural output value in the final part of the 20th century. In order to realize the vast strategic objectives put forward by the 12th party congress, we must speed up our energy resource development and carry on effective conservation.

Our country has rich energy resources. Our hydropower resources are first in the world and our coal resources third in the world. Our long-term prospects in such energy resources as petroleum, natural gas, uranium and thorium are excellent. Since the state was founded, the energy industry has achieved great things. Our 1980 total energy output was fourth in the world, and our raw coal and crude petroleum output were third and sixth in the world respectively. The development and effective utilization of our country's rich energy resources will make us fully capable of adapting to the requirements of our country's socialist modernization.

According to preliminary statistics and assumptions, by the year 2000 our country's total annual energy output will be twice the 1980 value, while the output of electricity will keep pace with industrial growth. The task of constructing and developing the energy industry is a glorious and difficult one.

Coal is our country's main energy resource, and we must accord a high priority to speeding up its development. In keeping with our country's resources and their distribution, and with the distribution of productive capabilities and transport conditions, we must accelerate coal mine construction in the 10 major coal bases and the 5 major coal opencuts. While improving the geographical distribution of the coal industry, we must also continue with the policy of supporting local and commune and brigade coal mine development.

The electric power industry must gradually focus its development on the utilization of hydropower resources, construct a series of large-scale hydroelectric stations, develop long-distance high-voltage transmission lines, and bring electric power to consumer areas. Fossil-fired electric power generation, which is based primarily on coal, must stress development of minehead power stations. Nuclear power stations should be built in areas with serious energy shortages.

In order to speed up the development of the petroleum industry, in addition to effective exploration for oil and natural gas on land, we are now using foreign capital to prospect for and develop offshore oil.

We must also develop and utilize various new energy sources in accordance with local conditions; in east and north China we must popularize the use of solar energy, in the countryside we should popularize the use of biological energy, methane and the cultivation of firewood forests. Areas which are in a position to do so should develop small-scale hydroelectric power and small-scale coal mining, and where suitable they should study the development and utilization of wind power, geothermal power, tidal power and the like.

If by the year 2000 energy production has only doubled, this will not meet the needs of a tripled annual industrial and agricultural output. Tripling energy production will depend on technical progress and conservation, and will require maximum improvement in the economic effectiveness of energy utilization, making 1 ton of energy resources do the work of 2 and determinedly decreasing energy consumption. By means of enterprise consolidation we must further strengthen enterprise management, establish a well-functioning economic responsibility system, block waste resulting from leaks in the production system, and decrease irrational energy consumption; by readjusting the economic structure, industrial structure and production structure, we must utilize energy more effectively, placing the short-term focus on planned closures of certain backward enterprises whose products are of poor quality and unmarketable, as well as of certain high-energy-consumption scale iron and steel works, small-scale calcium carbide plants, small-scale oil refineries, and local coke plants; we must conscientiously and effectively carry out technical reform of existing enterprises, with a focus on energy conservation, modernize obsolete processes with high energy consumption in a planned and focused fashion, replace or abandon existing low-efficiency boilers, water pumps, blowers, electric motors, transformers, internal combustion engines, kilns and other high-energy-consumption equipment, and greatly decrease energy consumption in product production. At the same time, we must use new technologies and use new durable goods with low energy and materials consumption and high quality so as to achieve conservation in the broader sense.

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CSO: 4013/51

ZHEJIANG ENFORCES QUOTA SYSTEM TO REDUCE ENERGY CONSUMPTION

Hangzhou ZHEJIANG RIBAO in Chinese 2 Nov 82 p 1

[Article by Yu Dehong [0205 1795 7703]: "Zhejiang Industry Energy Conservation"]

[Text] This year the industrial and transporation departments in Zhejiang have made greater efforts to conserve energy. In the January to September period, the gross industrial value of production in Zhejiang grew 8.2 percent as compared to the same period in 1981, while the energy supply grew only 3.2 percent. As compared to the same period in 1981, coal consumption per 100 million yuan of industrial output value has decreased by 7 percent for a saving of 320,000 tons of raw coal.

Zhejiang lacks energy resources, and various party and government organs have made extra efforts in management and conservation to solve this difficulty. One major step was to adopt the quota assignment system. At the beginning of 1982, industrial and mining enterprises in Zhejiang have widely modified their product fuel consumption quota based on progressive and reasonable standards. In particular, the consumption quotas for major products have been modified and adjusted one by one. According to preliminary estimates for 1,800 major coal consumption units, the modified quotas are on average 5 percent lower than before. The quota assignment system has fully mobilized the initiative of the enterprises. Many enterprises are now planning before using energy and divide quotas into smaller sub-targets to be implemented at the shop and on group and individual levels and use the quota as an important evaluation indicator in the economic responsibility system.

Various local departments in charge of production and local enterprises have also established different forms of conservation organizations to strengthen the management. Many municipalities and counties have also organized efforts to conduct extensive conservation inspections to develop the potential further. Trade federation union branches and fuel companies have organized coal conservation competitions for boilers and opened up technology exchange and cooperation activities to reduce coal consumption. The province now has a dozen municipal and county boiler technology exchange teams and 300~400 boiler workers actively dissiminating techniques, training workers and improving boilers. By the end of September, 16,800

boiler workers in Zhejiang had basically been trained in conservation and boiler condition and worker level have generally been improved. A large number of advanced boiler workers and progressive boilders have come on the scene to make more progress.

In order to further advance the conservation effort, provincial departments and various local industries and mines have established conservation reward system to encourage the enterprises striving for the highest standards. In the meantime, the provincial people's government has also issued highest consumption limits for 17 major products. Units that exceed the limit and have waste are given orders to improve by a certain date otherwise their coal supply will be reduced or stopped At the end of 1981 and in April 1982 the provincial economic committee twice issued builletins to curb energy waste and obtained good results by ordering 11 particularly wasteful enterprises to improve. The Xianju silk plant used to consume 57.5 tons of coal for every ton of white silk produced. After coal supply to the plant was halted for consolidation and management strengthening, the per unit coal consumption at the plant in June has dropped to 19.4 tons. Since 1 March, fuel supply departments began to charge an extra 50 percent on the over-the-quota energy consumed by various units. This extra expense, which may not be included in production costs, has a good effect on promoting coal conservation.

9698
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ZHEJIANG 'ENERGY CONSERVATION MONTH' ACHIEVEMENTS NOTED

Hangzhou ZHEJIANG RIBAO in Chinese, 29 Dec 82 p 1

/Article: "The Leadership at Each Level Emphasized It, Measures Were Concrete and Practical, and the Province's 'Energy Conservation Month' Activities Realized Good Results"/

/Text/ Since Zhejiang's industrial and mining enterprises launched "energy conservation month" activities in August, visible results have been realized.

In the "energy conservation month" activities, nine prefectures, cities and most counties and major provincial level energy consuming departments (bureaus) have organized general inspection of energy conservation. The five provincial departments (bureaus) of petrochemistry, electric power, building materials, first light industry and second light industry bureaus organized 14 inspection groups to inspect 75 key energy consuming enterprises. In the inspection, each locality summarized and popularized the experience of some enterprises that have done well in energy conservation work, helped enterprises that have lagged behind in energy conservation to find out the cause of over consumption and waste, and took effective measures to quickly change the backward situation.

To stimulate activities of this "energy conserving month" to achieve more results, several major industrial bureaus of Hangzhou City and concerned departments of such cities and counties as Wenzhou, Jinhua and Yuyao used the "100 points system" and the "1,000 points system" according to concerned regulations promulgated by the state to inspect the enterprises according to each regulation. Those found not to meet the standards stipulated by the regulations were urged to improve. The Bureau of Light Industry of Hangzhou City began from the third quarter to divide the regulations concerning energy conservation promulgated by the state into nine categories for management, boilers, pool boilers, water, electricity, steam, vehicles, coal yards, oil depots. Each category was further divided into several smaller items and points were assigned. These were issued to subordinate enterprises to implement accordingly. In the "energy conservation month" activities, that bureau also organized 10 special groups to inspect and grade 34 enterprises. This bureau systematically compiled 1,105 rules on comprehensive energy conservation, and 583 items were completed. It is revising and deciding to revise 522 rules. By the end of November, the total production value of the whole bureau increased 9.05 percent. Energy consumption per 10,000 yuan of production value dropped 5.4 percent.

Under the push of the "energy conservation month" activities at each locality, leadership in energy conservation and energy management agencies were widely established and strengthened. All of the province's 135 enterprises that consume over 10,000 tons of energy have established energy conservation organizations and personnel now. In some regions, enterprises that consume over 1,000 tons of coal a year have also established energy conservation organizations or special personnel. The basic work in energy management has also been greatly strengthened. The 135 enterprises that consume over 1,000 tons of energy will have completed installation of energy consumption meters by the end of next year. At present, 119 enterprises have already established plans to install meters. Ningbo City directly grasped the work of installing meters at 112 enterprises that consume over 120 tons of coal each year and electricity meters, water meters and steam flow gauges totaling more than 2,500 units, constituting over 75 percent of the number of meters that should be installed. Throughout the province, over 1,000 enterprises further revised quotas for more than 3,000 major industrial products, reduced consumption quotas, stimulated the enterprises themselves to strengthen quota management, and implemented methods for reward and punishment. Jiangxing Prefecture, Jinhua Prefecture, Shaoxing City, the Hangzhou Steel Plant, the Huafeng Paper Manufacturing Plant, the Lanjiang Smelting Plant, and the Second Hangzhou Cotton Textile Plant also promulgated fuel management methods or regulations for their own areas or units as regulations and methods for the factories to implement. This greatly stimulated routine energy conservation work.

9296
CSO: 4013/97

BRIEFS

YUNNAN 1982 ELECTRICITY CONSERVATION--From January to November, Yunnan conserved more than 73.3 million kilowatt-hours of electricity and it is expected that by year's end, about 80 million kilowatt-hours of electricity can be conserved. The provincial office in charge of planned consumption, conservation and mass management of electric power and the Provincial Electric Power Administrative Bureau conscientiously implemented the directives of the provincial committee and the provincial people's government, widely carried out propaganda and education to conserve the use of electricity, implemented forceful measures, popularized the experience in technical improvements for energy conservation, strengthened management of electricity used in living, and promoted the work of conserving electricity. The main measures to conserve electricity throughout the province were: strict implementation of planned use of electricity; conversion of the system of guaranteed fees for electricity for living within the large power network to installation of electricity meters and charging fees for measured amounts of electricity used; and activities launched by industrial and mining enterprises in technical improvement centered around energy conservation. /Text/ /Kunming YUNNAN RIBAO in Chinese 23 Dec 82 p 1/ 9296

CSO: 4013/97

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